

**DEPARTMENT OF DEFENSE (DoD) AUTOMATED INFORMATION SYSTEMS (AIS)  
ECONOMIC ANALYSIS (EA) GUIDE**

By

RONALD C. WILSON  
OSD (PA&E)

(1995)



*“Nobody Said It Was Going to Be Easy. He was Wrong!”*

*RCW (1995)*

## **Table of Contents**

<b>Chapter 1</b>	<b>AUTOMATED INFORMATION SYSTEM ECONOMIC ANALYSIS</b>
1.1	PURPOSE
1.2	AIS EA DOCUMENTATION AND REVIEW PROCEDURES
1.3	STANDARD AIS EA REQUIREMENTS
<b>Chapter 2</b>	<b>DoD AIS EA RESPONSIBILITIES</b>
2.1	MILESTONE DECISION AUTHORITY
2.2	FUNCTIONAL ECONOMIC ANALYSIS AGENT (FEAA)
2.3	DIRECTOR, PROGRAM ANALYSIS AND EVALUATION
2.4	AIS ACQUISITION PROGRAM MANAGER
2.5	INDEPENDENT COST AGENT
2.6	DOD INDEPENDENT AIS EA VALIDATION AUTHORITY
2.7	OSD PRINCIPAL STAFF ASSISTANTS
2.8	HEADS of DoD COMPONENTS
<b>Chapter 3</b>	<b>DoD AIS EA PROCEDURES AND REQUIREMENTS</b>
3.1	AIS EA PROCEDURES
3.2	AIS EA REQUIREMENTS
<b>Chapter 4</b>	<b>POM, BUDGET AND AIS EA INTERFACE</b>
4.1	INTRODUCTION
4.2	AIS EA & BUDGET ESTIMATES
<b>Chapter 5</b>	<b>CONTRACTOR SUPPORT FOR DoD AIS EA</b>
5.1	CONTRACTOR SUPPORT FOR DoD AIS EA

## **ATTACHMENTS**

<b>ATTACHMENT A</b>	<b>DoD AIS Economic Analysis Model, User's Manual</b>
<b>ATTACHMENT B</b>	<b>Cost Element Structure Definitions</b>
<b>ATTACHMENT C</b>	<b>Benefit Element Structure Definitions</b>
<b>ATTACHMENT D</b>	<b>Economic Analysis Techniques</b>
<b>ATTACHMENT E</b>	<b>Benefit Analysis Techniques</b>
<b>ATTACHMENT F</b>	<b>AIS Parameters &amp; Definitions</b>
<b>ATTACHMENT G</b>	<b>Model Formats and Reports</b>

## **FIGURES**

Figure 1-1	Initial AIS Program Cost Threshold Rating
Figure 1-2	AIS EA Development Plan
Figure 3-1	AIS Review Authority and Flow

Figure 3-2 Cost Benefits Review Schedule  
Figure 3-3 AIS EA Presentation Outline and Requirements

## Chapter 1

### **ECONOMIC ANALYSIS (EA)**

#### **1.1 PURPOSE.**

1.1.1 **AIS Program.** This guide, herein after referred to as the DAG (DoD AIS Economic Analysis Guide), implements the development, review and validation of EA for DoD AIS acquisition programs that are administrative in function or are predominantly supported by commercial off-the-shelf hardware, software and other infrastructure. The standard economic analyses and documentation required for an AIS are herein defined. Attachments to this guide provide further information on definitions, procedures, responsibilities, evaluation criteria, data submission formats and lead-times.

1.1.2 **AIS EA.** AIS EA includes any and all quantitative analysis employed by the Department to estimate, review or validate AIS program costs and benefits. AIS EA is required to determine the best AIS program acquisition alternative available to the government. The best alternative will generally be the one that meets critical mission requirements at the lowest life cycle cost (expressed in present value), and/or provides the most advantageous Return On Investment (ROI). The AIS EA should be reviewed and determined to be reasonable at each acquisition oversight milestone review and at any program review that approves expenditures or program progress beyond that approved at previous reviews.

1.1.3 **Questions and Recommendations.** This guide was developed by Ronald C. Wilson, Office of the Secretary of Defense, Program Analysis and Evaluation, in support of Department of Defense Major AIS acquisition oversight reviews required to determine the completeness and reasonableness of IT Economic Analysis. Please refer questions and recommendations to Mr. Wilson at 703-601-0417.

#### **1.2 AIS EA DOCUMENTATION AND REVIEW PROCEDURES.**

1.2.1. **Independent AIS EA Review.** The critical review and evaluation of DoD AIS EA as directed by OD(PA&E), is inherently an independent process that supports the AIS Life Cycle Management, acquisition oversight, and program review processes. As provided in DoD Directive 8120.1, OD(PA&E) is responsible for establishing and publishing DoD AIS EA guidance and conducting independent reviews. OD(PA&E) will conduct or delegate responsibility for independent AIS EA reviews for Major AISs. The EAs for AISs that are not designated as Major AISs and do not breach Major AIS cost thresholds will usually be evaluated by a DoD Independent Review Authority (DIRA) designated by the Principal Staff Assistant (PSA) and approved by OD(PA&E). The procedures, documentation formats and other requirements for delegated independent reviews will be consistent with the DAG. The DIRA will interface directly with any required data source.

1.2.2 **Functional Area Analysis.** A Functional Area Analysis (FAA), as defined in DoD 8000-series regulations, will be the initial type of business case analysis performed for any DoD AIS. The FAA should be developed by the designated FAA agent (FA<sup>3</sup>) of the Principal Staff Assistant for the functional area involved; it should provide the level of detail and accuracy needed to determine that an

AIS acquisition program would likely be the best Government alternative for meeting mission and functional requirements. The FAA should be used as the basis for the approval of Milestone 0, the establishment of an initial program funding profile, the assignment of an AIS Acquisition Program Manager (PM), and the assignment of the initial AIS program cost threshold rating as shown in Figure 1-1. In order to streamline the AIS acquisition review process during its initial phase, the FAA should not attempt to provide detailed analytical results that require an inordinate investment in time and resource, and in any case, cannot be substantiated at this stage of the program. The FAA for Milestone 0 should rely on macro level analysis, generic cost estimating relationships and analogies to similar system acquisition programs. As an AIS acquisition program is defined and matures, its parameters will become more clearly defined and it will then be possible to apply specific program analytic cost and benefit techniques. The AIS Acquisition Program EA (APEA) is the primary form of economic analysis that will be used after an AIS proceeds beyond Milestone 0 and an adequate basis for cost/benefits analysis is developed. Based on APEA results, FAAs should be updated and maintained by the AIS functional proponent throughout the life cycle of the AIS to ensure that the AIS program will meet functional goals.

1.2.3. AIS Acquisition Program EA. Subsequent to Milestone 0 approval for any AIS acquisition program or modernization effort that entails expenditure of combined Government resources in excess of \$2 million (FY 1990 constant dollars), all AIS acquisition program oversight reviews that sanction or allow for the continuance of program expenditures or advancement beyond previously approved limits will require an AIS Acquisition Program EA (APEA). The size, complexity, risk, cost and benefits associated with an AIS acquisition program will determine the level of detail and effort required for the APEA and the extent to which it will be independently reviewed. OD (PA&E), in coordination with OASD(C<sup>3</sup>I), will determine EA requirements and review procedures.

1.2.4 AIS Cost Analysis Requirements Description. In general, any program that requires more than \$25 million (FY 1990 constant dollars) to implement will require the development of an AIS Cost Analysis Requirements Description (CARD) as defined in DoD 5000.4-M, to provide an analytic baseline to support the APEA.

1.2.5 Independent Cost Estimate. Any AIS acquisition program that is designated a Major AIS will also require an Independent Cost Estimate (ICE ) or Component Cost Analysis (CCA) as defined in DoD Directive 5000.4. An ICE is not ordinarily required for other than Major AISs, but the DIRA may determine that an independent cost estimate should be performed for selected portions of the program that have particularly high cost or schedule risks. As indicated in Figure 1-1, however, a Sufficiency Review (Independent cost analysis of high risk cost elements) may be authorized vice an ICE for C, D and E rated programs.

1.2.6 AIS EA Development Plan. Within ninety days after Milestone 0 approval, or as soon as possible after a Life Cycle Management review has been scheduled, the AIS Program Manager and the FA<sup>3</sup> will develop an AIS EA Development Plan, Figure 1-2, that must be reviewed and approved by the DIRA [OD(PA&E) for Major AISs]. The AIS EA Development Plan will be updated for each LCM review and will indicate the purpose, responsibilities, analytic procedures, milestones and the ground rules and assumptions that apply to each specific AIS acquisition program. The AIS EA Development plan will be signed by the PM, FA<sup>3</sup>, DIRA, and, if applicable, the individual responsible

for the development of the AIS EA CARD. As required, the AIS EA Development Plan will be approved by the MDA and the OD (PA&E) Principal to the MAISRC.

### 1.3 STANDARD AIS EA REQUIREMENTS.

1.3.1 Standard AIS EA documentation. Standard AIS EA documentation required after Milestone 0 is shown in the following and Figure 1-1: Development of the documentation will be evolutionary; updates will be made as changes occur in the program or costs become better defined. For a milestone or other program review, EA documentation should incorporate the most up-to-date information available.

1.3.1.1 MAJOR AIS. (AIS cost ratings of A, B or C) Major AISs, as defined in DoD series-8120 regulations,

<u>Document</u>	<u>Primary Responsibility</u>
1. APEA	PM
2. AIS EA CARD	PM
3. Independent Cost Estimate (ICE) or Component Cost Analysis (CCA)	Designated Agent
4. FAA	FA <sup>3</sup>

1.3.1.2 COMPONENT AIS. (AIS cost rating of D) Not a Major AIS but more than \$25 million (FY90 constant dollars) in total program cost or more than \$10 million in any one fiscal year:

<u>Document</u>	<u>Primary Responsibility</u>
1. APEA	PM
2. AIS EA CARD	PM
3. FAA	FA <sup>3</sup>
4. ICE (may be required by the DIRA for high risk cost items)	

1.3.1.3 MINOR or COMMAND AIS PROGRAM. (AIS cost rating of E) Less than \$25 million but more than \$5 million (FY90 constant dollars) in total program cost or more than \$2 million in any one year:

<u>Document</u>	<u>Primary Responsibility</u>
1. APEA (Life Cycle Cost only)	PM
2. FAA	FA <sup>3</sup>

1.3.1.4 OTHER AIS PROGRAM. (AIS cost rating of F) Less than \$ 2 million (FY90 constant dollars) in total program cost:

<u>Document</u>	<u>Primary Responsibility</u>
FAA	FA <sup>3</sup>

### INITIAL AIS PROGRAM COST THRESHOLD RATING

Rating	Program	Life Cycle	Oversight	Cost/ Benefit	Documentation			
	Cost	Cost	Authority	Review Authority	Card	APE A	ICE	FAA
A.	Over \$500M	Over \$1.0 B	MAISRC	OD (PA&E)	X	X	X	X
B.	Over \$200M	Over \$500M	MAISRC	OD (PA&E)	X	X	X	X
C.	Over \$100M	Over \$200M	MAISRC	OD (PA&E)	X	*[X or (SR)]		X
D.	Over \$25M	Over \$50M	Component	Delegated Authority		X	(SR)	X
E.	Over \$5M	Over \$10M	Component (Command)	Delegated Authority		LCC	(SR)	X
F.	Less than \$5M	Less than \$10M	Component (Other)	Delegated Authority		LCC		X

*(SR) - Sufficiency Review of selected cost elements*

*\* - As approved by Independent EA Review Authority*

**Figure 1-1**

## AIS EA DEVELOPMENT PLAN (EA DP)

### Subject (AIS Name)

#### 1. Purpose

The purpose of this AIS EA Development Plan (AIS EA DP) is to document the analytical approach and methodology and responsibilities for preparing cost and benefits estimates on the (AIS Name) for Milestone/IPR on (date). This memorandum will define the specific system architecture and alternatives that will be included in the analyses and establish the basic ground rules and assumptions which will underlie the cost estimates, and the Milestone and overall procedures to be followed in developing and presenting the cost and benefits estimates to OSD for review by OD (PA&E). All estimates will be developed, documented and submitted for OD (PA&E) review in accordance with OD (PA&E) guidance as provided in the "DoD AIS EA Guide"

#### 2. Responsibilities

- |  | (Name/Rank),  | Company, Location, Phone # |
|--|---|----------------------------|
| a. The PM cost/benefit team will consist of:                           |   |                            |
| -1   | _____ Program Manager,  | _____                      |
| -2   | _____, Lead Cost Analyst,   | _____                      |
| -3   | _____, Cost Analyst,  | _____                      |
| b. Cost Analysis Requirements Description (CARD) Team will consist of: |   |                            |
| -1   | _____, Lead Analyst,  | _____                      |
| -2   | _____, Analyst  | _____                      |
| c. The ICE cost team will consist of:                                  |   |                            |
| -1   | _____, Lead Cost Analyst,   | _____                      |
| -2   | _____, Cost Analyst,  | _____                      |
| d. The Functional Sponsor's Representative cost team will consist of:  |   |                            |
| -1   | _____, Lead Cost Analyst,   | _____                      |
| -2   | _____, Cost Analyst,  | _____                      |
| e.   | _____ will provide the Service position on the cost estimate and economic analysis. |                            |
| f. The DoD Independent Critical Review team will consist of:           |   |                            |
| -1   | _____, OD(PA&E), Group Leader,  | _____                      |
| -2   | _____, Other Analyst  | _____                      |

FIGURE 1-2, page 1

### 3. Procedures:

#### a. Alternatives.

The alternatives to be included in the cost/benefits estimates are:

(Brief description and scope of each alternative)

- 1 Alternative 1, Status Quo
- 2 Alternative 2, Preferred Alt \_\_\_\_\_
- 3 Alternative 3, \_\_\_\_\_
- 4 Alternative 4, \_\_\_\_\_

#### b. Approach and Methodology.

Briefly indicate the analytical approach for each major cost element of the PM estimate and ICE.

#### c. Data Submission.

The Cost Element Structure identified on the standard (OD/PA&E) cost benefits templates is to be used in presenting cost and benefits estimates. Supplemental spreadsheets may be required to cover an in-depth analysis or Cost Estimation Relationships (Models). Formats AIS-SUM, A, AP, BA, BB, BP, FB, HA1-5, HB1-5 and HP will be provided as indicated in the Guide. An EXCEL 4.0a data file which contain the templates to be used in presenting the economic analysis was provided on \_\_\_\_\_, by \_\_\_\_\_, to \_\_\_\_\_.

#### d. Tentative Schedule:

- 1 - Draft CARD, to include the FEA, Status Quo estimate and the Benefits estimate with draft documentation will be provided to PA&E no later than \_\_\_\_\_.
- 2 - Draft PM documentation will be provided to PA&E no later than \_\_\_\_\_.
- 3 - Draft ICE documentation will be provided to PA&E no later than \_\_\_\_\_.
- 4 - Final documentation from the FAS will be provided to PA&E no later than \_\_\_\_\_.
- 5 - Final documentation from the PM will be provided to PA&E no later than \_\_\_\_\_.
- 6 - Final documentation from the ICE will be provided to PA&E no later than \_\_\_\_\_.
- 7 - OD (PA&E) presentation, if required, will be held in Room \_\_\_\_\_, Pentagon, at 1000 hours on \_\_\_\_\_.

#### e. ICE provisions:

In lieu of an independent cost estimate the ICE will contain an independent assessment of the PM estimate for the following cost elements: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_. A complete independent cost estimate will be provided on all other cost elements. (Waiver of the ICE may granted for Milestone I, but not thereafter. Waivers must be requested and approved in writing by OD (PA&E).

**FIGURE 1-2 ; Page 2.**

#### **4. Ground Rules and Assumptions**

- a. Base Year for all estimates will be \_\_\_\_\_.
- b. The life cycle will be \_\_\_\_\_ through \_\_\_\_\_.
- c. Sunk Costs will cover the period \_\_\_\_\_ through \_\_\_\_\_.
- d. IOC is \_\_\_\_\_. FOC is \_\_\_\_\_.
- e. Upgrades will be shown in the years \_\_\_\_\_ and \_\_\_\_\_.
- f. A discount rate of \_\_\_\_\_ will be used.
- g. The MNS dated \_\_\_\_\_ has been approved by the MDA SDM, dated \_\_\_\_\_.
- h. The most recent cost/benefit analysis (or baseline) accepted by OD (PA&E) was originated by \_\_\_\_\_ and dated \_\_\_\_\_.
- i. The last Service POM (date \_\_\_\_\_) included the program at the following levels \_\_\_\_\_.
- j. The last Service BES (date \_\_\_\_\_) included the program at the following levels \_\_\_\_\_.
- k. Provide or upgrade the CARD/Benefit Report, which is dated \_\_\_\_\_.

---

**AIS Program Manager**

---

**CARD Team Leader**

---

**Functional Sponsor's Representative**

---

**ICA Team Leader**

---

**OD (PA&E)/Independent Review/Validation**

**FIGURE 1-2 Page 3**

## Chapter 2

### **DoD AIS EA RESPONSIBILITIES**

**2.1 MILESTONE DECISION AUTHORITY (MDA).** The MDA is the DoD official designated by the ASD(C<sup>3</sup>I) to act as the acquisition program review and milestone approval authority for a specific AIS. The MDA will:

- \* Ensure that assigned AIS programs comply with the DoD acquisition and AIS life cycle management policies;
- \* Coordinate approval of AIS milestones;
- \* Consider FAA, APEA, and Independent Cost Estimates (ICE) in making Major AIS life cycle management decisions.

**2.2 FUNCTIONAL AREA ANALYSIS AGENT (FA<sup>3</sup>).** The FA<sup>3</sup> is the individual designated by the Principal Staff Assistant who will be responsible for:

- \* Ensuring the accuracy and completeness of the Mission Needs Statement,
- \* Developing the AIS Status Quo Estimate,
- \* Developing the AIS Benefit Estimate,
- \* Developing the FAA
- \* Developing the "As Is" and "To Be" Economic Models
- \* Developing and presenting to review authorities the FAA
- \* Developing the Functional Area AIS Budget profile

**2.3 DIRECTOR, PROGRAM ANALYSIS AND EVALUATION (OD(PA&E)).** The OD(PA&E) ensures that costs associated with DoD plans, program, and budgets are presented accurately and completely, and, when implemented, will support approved policies, standards, and defense objectives. In addition, the OD(PA&E) will:

- \* Act as the DoD authority for AIS Economic Analysis and in this capacity shall issue or as appropriate, approve guidance governing development, documentation, and validation of AIS APEAs, Life Cycle Cost Estimates, Benefit Estimates Independent Cost Estimates and Independent Sufficiency Reviews (ISRs).
- \* Review and validate DoD AIS program APEAs, and LCC estimates, or, as appropriate, delegate this responsibility.

- \* Present economic analytic findings on programs under review to the MAISRC and coordinate on oversight decisions.

**2.4 AIS ACQUISITION PROGRAM MANAGER (PM).** The PM will develop, document, and present to reviewing officials the Program Office Life Cycle Cost estimates for executable program alternatives. It is the PM's responsibility to:

- \* Develop and coordinate with the FA<sup>3</sup> to establish the Preferred AIS Alternative,
- \* Ensure that the APEA estimate is accurate, and includes all resources required to support the preferred programmatic alternative that meet the Mission Need Statement.
- \* Identify areas of substantial cost estimation uncertainty;
- \* Implement design and management strategies to control cost risk;
- \* Document, explain, and assist in the resolution of differences among independent LCC estimates, the PM's LCC estimate, and estimates incorporated into AIS EAs.
- \* Develop and present the AIS Cost Analysis Requirements Document (AIS CARD).

**2.5 INDEPENDENT COST AGENT (ICA).** The ICA is an office or individual who is independent of the PM, and is not answerable to any individual associated directly either with the AIS program office, the FA<sup>3</sup>, of the functional process that will be directly impacted by the AIS acquisition program or the acquisition process. The ICA will prepare and present to reviewing officials a complete DoD Component (Independent) LCC estimate (ICE) for the Program Manager's preferred AIS alternative. In so doing, the ICA will:

- \* Review and assess all relevant assumptions made by the PM's office and the FAS.
- \* Identify assumptions or conclusions incorporated into the PM's estimate that involve significant cost risk, and employ risk analysis techniques to quantify the potential effect of these assumptions on the LCC estimate;
- \* Identify and explain, by cost element, any differences among estimates; and,
- \* Assist in the resolution of differences among estimates.

**2.6 DOD INDEPENDENT AIS APEA VALIDATION AUTHORITY.**

- \* Acts as the DoD AIS Economic Analysis review authority for delegated or less than major AIS acquisitions; and,
- \* Reviews assigned AIS APEA estimates and advises the MDA as to their completeness and accuracy.

**2.7 OSD PRINCIPAL STAFF ASSISTANTS (PSAs).** OSD PSAs are charged with leading the DoD's Functional Process Improvement efforts. As these efforts involve IT acquisition, OSD PSAs will

- \* Ensure that FAAs are developed to provide the analytic basis for an AIS program Mission Needs Statement and Milestone 0 approval;
- \* Appoint an FA<sup>3</sup> for each AIS program that supports an assigned functional or business area;
- \* Ensure that AIS programs supporting assigned functional or business areas comply with the DoD's AIS program EA policies.

**2.8 HEADS OF DOD COMPONENTS.** Heads of DoD Components shall:

- \* Ensure that the DoD's AIS program EA policies, as provided in this Guide, are applied to AIS programs under their purview.
- \* Act as the PSA when appropriate

## Chapter 3

### **DEPARTMENT OF DEFENSE** **AIS EA PROCEDURES AND REQUIREMENTS**

#### **3.1 AIS EA PROCEDURES.**

Specific AIS APEA responsibilities are explained later in this chapter, however, figure 3-1 displays the general procedural flow of the AIS APEA process. Selection by functional process managers of the most cost-effective initiatives to pursue is supported by and documented in an initial Functional Area Analysis (FAA). If it is determined that an IT modernization is a required component of a business process improvement initiative, the initial FAA also provides supporting rationale for a Milestone 0 acquisition decision to approve the AIS Mission Need Statement (MNS) and the designation/funding justification for an AIS acquisition program. The FAA also provides the macro analytic basis for the designation of the cost magnitude and AIS cost threshold rating of the AIS program as shown in Figure 1-1. The Functional Manager must notify the appropriate Milestone Decision Authority (MDA) and the Comptroller of the need to initiate an acquisition program. A Program Executive Officer (PEO) and Program Manager (PM) will be appointed by appropriate authority. The PSA will designate a Functional Area Analysis Agent (FA<sup>3</sup>). The FA<sup>3</sup> and PM will work together to validate and, as required, refine the AIS Mission Need Statement. Most importantly, they will develop an AIS Cost Analysis Requirements Description (CARD) (described in DoD 5000.4-M), and a Benefit Proposal as a detailed description of the baseline features of the proposed AIS and functional business process being developed and impacted, respectively.

3.1.1 Validation:The development, validation and application of APEA follows the course of Department Planning, Program, Budgeting and System Acquisition processes.

3.1.1.1 PLANNING: DoD Directive 8000.1 assigns responsibility for improving efficiency and reducing the costs of DoD's business operations.

3.1.1.2 PROGRAM & BUDGETING: DoD Directive 8020.1 specifies a structured analytic approach to identification of business area improvement initiatives, the development of the FAA, and the integration of the FAA estimates into the PPBS.

3.1.1.3 ACQUISITION: DoD Directive 8120.1 defines AIS Life Cycle Management; and, the requirement for development of AIS APEA and OD(PA&E) APEA oversight to ensure AIS program estimates are accurate and complete.

3.1.2 Subsequent to Milestone 0: In general, AIS APEA documentation and presentation responsibilities are iteratively refined. Basic responsibilities for AIS APEA documentation are:

##### 3.1.2.1 THE FUNCTIONAL AREA ANALYSIS AGENT (FA<sup>3</sup>).

- a) Functional Area Analysis
- b) Budget Submission Proposal
- c) "As Is" and "To Be" Process Models
- d) AIS Status Quo Estimate
- e) AIS Benefit Estimate

#### 3.1.2.2 THE PROGRAM MANAGER (PM).

- a) Preferred AIS Alternative LCC estimate
- b) Other executable/reasonable AIS alternative LCC Estimates
- c) AIS APEA
- d) Develop AIS CARD

#### 3.1.2.3 THE INDEPENDENT COST AGENT. (MAJOR AIS Programs)

- a) The Component Cost (Independent) Estimate of the preferred AIS alternative
- b) Determine CARD adequacy

#### 3.1.2.4 INDEPENDENT REVIEW AUTHORITY.

- a) Reconciliation/Risk Analysis Estimate
- b) Report to MDA

### 3.2 AIS EA REQUIREMENTS

3.2.1 EA Components: There are essentially six major components in DoD AIS Program Economic Analysis. Each component, as defined in the following and shown in figure 3-4, is represented as a spreadsheet in the DoD AIS EA model. Entering the appropriate data (estimates) in the model and providing supporting documentation for the independent review of the estimates, in effect, constitutes DoD AIS EA.

1. Sunk Costs: Costs that have already been expended or are otherwise irretrievable.
2. Sunk Benefits: Benefits that are attributable to sunk costs.
3. Future Status Quo Costs: Costs incurred to support the Status Quo AIS (or manual system) over the life cycle of the comparative alternative. The Status Quo AIS (or manual system) over the life cycle of the comparative alternative. The Status Quo alternative includes only the minimum investment required to sustain current operations that includes all sunk investment, but no planned upgrades or modernizations.
4. Future Status Quo Benefits: All estimated future benefits that will result from the extant Status Quo system that includes all sunk investment toward accomplishing the comparative alternative.
5. Future Comparative Alternative Costs: The total cost to the Government to implement fully at all required operational sites any alternative other than the Status Quo (may be the Status Quo, modified or the Preferred Alternative) and sustain the system over its life cycle to include an operational period of 10 years after Full Operational Capability (FOC) is achieved, and a system upgrade 4-6 years after FOC. This alternative also includes the cost to phase out the Status Quo.
6. Future Comparative Alternative Benefits: All estimated future benefits that will result from the remaining future implementation of the Comparative Alternative.

3.2.2 AIS Program Return on Investment. From the six component spreadsheets of the DoD AIS model ROI is determined and the following are derived:

a. AIS Program Cost (the cost to attain FOC)

Sunk Cost **plus** Future Costs until FOC is attained (Includes Status Quo phase out) **minus** Cost to maintain Status Quo until proposed FOC date (if AIS alternative were not implemented) **equals** AIS Program Cost. AIS Program Cost is, therefore, the net annual difference (summed) between the cash flow required to maintain the Status Quo vice the cost to implement the alternative and phase out the Status Quo.

b. AIS Investment

AIS Program Cost **minus** Sunk Cost equals AIS Investment Costs

c. AIS Return

AIS benefits **minus** sunk benefits **minus** Status Quo benefits **equal** AIS future net benefits. i.e. benefits over and above benefits that are not yet available and would be available over and above the benefits provided by the Status Quo system. Net future benefits include the difference in cost to operate the Status Quo system versus the cost to operate the alternative AIS over the full lift cycle of the alternative system. AIS net future benefits **equals** Return.

d. AIS Program Return on Investment

AIS Return **divided** by AIS Investment **Equals** Return on Investment

e. AIS Life Cycle Cost (LCC)

Sunk Cost **plus** AIS program future costs **equals** AIS LCC.

3.2.3 AIS APEA Timelines and Documentation. AIS APEA timelines and documentation associated with this process are indicated in figure 3-2, "Cost/Benefit Review Schedule". The specific requirements for each Major AIS program Cost/Benefit review and validation are normally tailored for each program. Specific requirements are documented in the AIS EA Development Plan (EA DP) as shown in figure 1-2. Cost/Benefit documentation is submitted in standard input spreadsheet formats (figure A-1) using standard cost/benefit data elements provided in Attachments B and C. AIS APEA presentations to OD(PA&E) for Major AIS programs, when required, will follow the outline provided in figure 3-3.

3.2.4 AIS EA Reviews.

3.2.4.1 INDEPENDENT REVIEW AND VALIDATION AUTHORITIES.

Within the DoD acquisition system, OD(PA&E) provides the independent review and validation of

acquisition program costs and effectiveness analyses. This responsibility extends to automated information system acquisition programs. For AIS programs, PA&E will normally perform this independent review and validation function only for those systems being evaluated by the Major Automated Information System Review Council. Thresholds for delegation of this review and validation responsibility are described below and Figure 1-1:

3.2.4.1.1 Major AIS Programs. OD(PA&E) is the review authority for AIS programs that meet the definition of a Major AIS, and, will review those programs or delegate responsibility for conducting those reviews to another agency. If milestone decision authority for a program is delegated to a DoD component, PA&E will normally also delegate APEA review and validation authority. The AIS review process and the criteria (including the requirement for an ICE) for review and validation of delegated programs will be identical to those required for non-delegated AIS programs. Copies of APEAs for delegated programs will be provided to OD(PA&E).

3.2.4.1.2 Component AIS Programs. The DoD component independent cost agency (ICA) will act as the APEA review and validation authority for non-major AIS programs requiring investments of (in FY90 dollars) more than \$10 million in any single fiscal year, \$25 million in total program costs, or \$75 million in life cycle costs. An ICE is not required. APEA documentation for these AIS programs must be submitted in the standard structure specified by PA&E, and a copy must be provided to PA&E.

3.2.4.1.3 Command AIS programs. The DoD component ICA will also serve as the APEA review and validation authority for AIS programs costing less than Component AIS Programs but more than (in FY90 dollars) \$2 million in any single fiscal year, \$5 million in total program costs, or \$15 million in life cycle costs. This EA review and validation authority may be delegated, however.

3.2.4.1.4 Other AIS Programs. AIS programs that cost less than Command AIS Programs can be supported solely by FAA prepared in accordance with DoDD 8120.1. Review and validation of these analyses by an organization independent of the functional and/or program manager is not required.

3.2.5 Review Objectives. Preparation of an AIS APEA is an iterative process that matures with the program. The precision with which costs and benefits can be estimated is dependent upon the precision in the AIS program definition. As the program's concepts, design alternatives, and requirements become better defined, APEA validations standards become higher. Guidelines for the critical APEA review of AIS programs are described in the following: Milestones 1, 3 and 4 are optional as are In Process Reviews. These reviews will be conducted only as required for specific programs by the Milestone Decision Authority (MDA). Milestones 0 and 2, the Baseline Milestone, are required for all programs. All programs must be approved for Milestone 0 prior to the initial AIS Budget Submission and Milestone 2 (Baseline) must be approved before final contracts may be signed or resources for implementation may be expended. If a program breaches its Cost, Performance, Schedule, Benefits baseline by 15% the program must be rebaselined. Rebaselining may require an MDA oversight review and revalidation of AIS APEA and ICE data.

3.2.5.1 MILESTONE 0. Validate the scope and magnitude of the AIS program within the context defined by the Functional Area Analysis. Review the overall parameters of the program and determine the cost magnitude of the proposed program (see Figure 1-1). Assign program cost rating.

3.2.5.2 MILESTONE I. Validate the accuracy of the estimated life cycle costs and benefits of each AIS program alternative. Review:

- a) Review the CARD for completeness, accuracy and consistency with the stated benefits of the AIS
- b) The PM's AIS APEA for consistency with resource constraints and program scope. (The program must meet the stated mission need and be capable of generating the estimated benefits.)
- c) The FAA focusing on the benefits analysis.
- d) The consistency of the estimated benefits versus estimated program cost, the mission needs statement and assumed constraints.
- e) The ICE. (The ICE may be waived at Milestone I and replaced by a sufficiency review if approved in writing by the APEA review authority.
- f) Plans for and technical support teams established to refine the APEA.
- g) Component POM and budget submissions for consistency with the assumptions in the PM's AIS APEA and the FAA.

3.2.5.3 MILESTONE II. (Baseline Milestone) Validate the accuracy and reliability of the FAA for the Preferred AIS Alternative (within a range of plus or minus 20%). Consider and evaluate:

- a) the CARD
- b) the PM's AIS APEA;
- c) the FAA;
- d) the ICE (if applicable);
- e) the consistency of the estimated benefits and costs with the mission needs statement;
- f) the rationale behind changes in estimates from those previously submitted;
- g) the program baseline document;
- h) POM and budget submissions for the system;
- i) Selected Acquisition Reports or other special program resource estimates.

3.2.5.4 MILESTONE III AND SUBSEQUENT MILESTONES. Re-validate the accuracy and reliability of the AIS APEA for the Preferred AIS Alternative (within a range of plus or minus 10%). Consider and evaluate:

- a) the CARD
- b) the PM's AIS APEA;
- c) the FAA;
- d) the ICE (if applicable);
- e) the program baseline document;
- f) POM and budget submissions for the system;
- g) Selected Acquisition Reports or other special program resource estimates;

- h) the consistency of the estimated costs and benefits with the mission needs statement; and, the rationale behind changes in estimated from those previously submitted.
- i) tradeoffs that have been made to balance cost, schedule, and performance.

3.2.5.5 IN-PROCESS REVIEWS (IPR) OR OTHER REVIEWS BY THE MDA. AIS program resource requirements, and benefit and cost estimates must be reviewed to support program decisions by the Milestone Decision Authority. The procedures and documentation requirements for non-milestone reviews are identical to those that would be required for the next (higher) milestone review. However, the objective of non-milestone reviews will not be to validate that the AIS APEA is adequate to meet the next milestone. Rather, the non-milestone AIS APEA review will determine:

- a) If previous estimates remain valid or need to be re-baselined,
- b) If it is likely that the AIS APEA will be validated on schedule at the next milestone review,
- c) Identify any deficiencies that may preclude timely milestone approval
- d) Recommend appropriate corrective actions, if required, and
- e) Advise the MDA as to when it is likely that the AIS APEA requirements for the next milestone approval can be met.

3.2.6 Documentation Lead Times. Development of an AIS estimate should start at least one year prior to a required LCM review. At least six months should be allowed for completion of an ICE. These lead times are based on the assumption that an FAA has already been completed and approved in support of Milestone 0. Timelines for a typical Major AIS are described below:

3.2.6.1 D-TWELVE MONTHS, (FOR MAJOR AIS PROGRAMS) the FAS, AIS PM and DoD Component (Independent) Cost Estimate Agent meet with OD(PA&E) to establish the long term ground rules for the validation of costs and benefits. The FAA (if not already done), AIS CDP and the AIS CARD are initiated.

3.2.6.2 D-NINE MONTHS, (FOR MAJOR AIS PROGRAMS) the AIS CDP is submitted to OD(PA&E) and approved. A straw man AIS CARD is submitted to OD(PA&E) for review.

3.2.6.3 D-SIX MONTHS, the FAS, AIS PM, and AIS APEA review authority finalize the APEA scope, analytic approach, methodology, and documentation requirements. FOR MAJOR AIS PROGRAMS the final AIS CARD is submitted to OD(PA&E) and the DoD Component (Independent) Cost Agent. The FAS, AIS PM Independent Cost Agency representatives, and independent AIS APEA review authority jointly sign an agreement (Figure 1-2) that identifies the specific ICA review and validation requirements and responsibilities.

3.2.6.4 D-2 MONTHS, the FAS, AIS PM, and ICA (when applicable) provide the independent AIS APEA review authority two draft copies of the materials being prepared, including costs and benefit estimates in the standard cost/benefit element structure and formats.

3.2.6.5 D-1 MONTH AND 2 WEEKS, the FAS, AIS PM, and ICA (when applicable) provide the independent AIS APEA review authority two copies of their completed analyses.

3.2.6.6 D-1 MONTH, the FAS, AIS PM, and ICA (when applicable) present AIS APEA findings and estimates including all supporting documentation to the OD(PA&E) or the delegated independent AIS APEA review authority. (See Figure 3-3 for the required agenda for these presentations.)

3.2.6.7 D-2 WEEKS, As determined appropriate, OD(PA&E) or the Independent Cost Authority will forward an independent AIS APEA report to the MDA.

3.2.6.8 D-Day, is the scheduled date of the MDA's LCM or MAISRC review.

3.2.7 Functional Area Analysis Agent and Program Manger Presentations. The general agenda, briefing responsibilities, and suggested time limits for presentations to the independent AIS APEA review authority are provided in Figure 3-3. Copies of the briefing charts, briefing text (if one is used) shall be provided at the time of the presentation. Differences between the presentation and the AIS APEA documentation provided in advance should be noted and explained. A copy of the proposed briefing to the MDA must be provided at the presentation.

3.2.8 Reports from the Independent Review Authority. The AIS APEA independent review authority will provide to the MDA a report on each AIS program reviewed. The report will contain a recommended benefit and cost positions with an explanation for differences from the functional manager's estimates, required corrective or follow-on actions, and LCM decision recommendations.

AIS Economic Review Authority and Flow

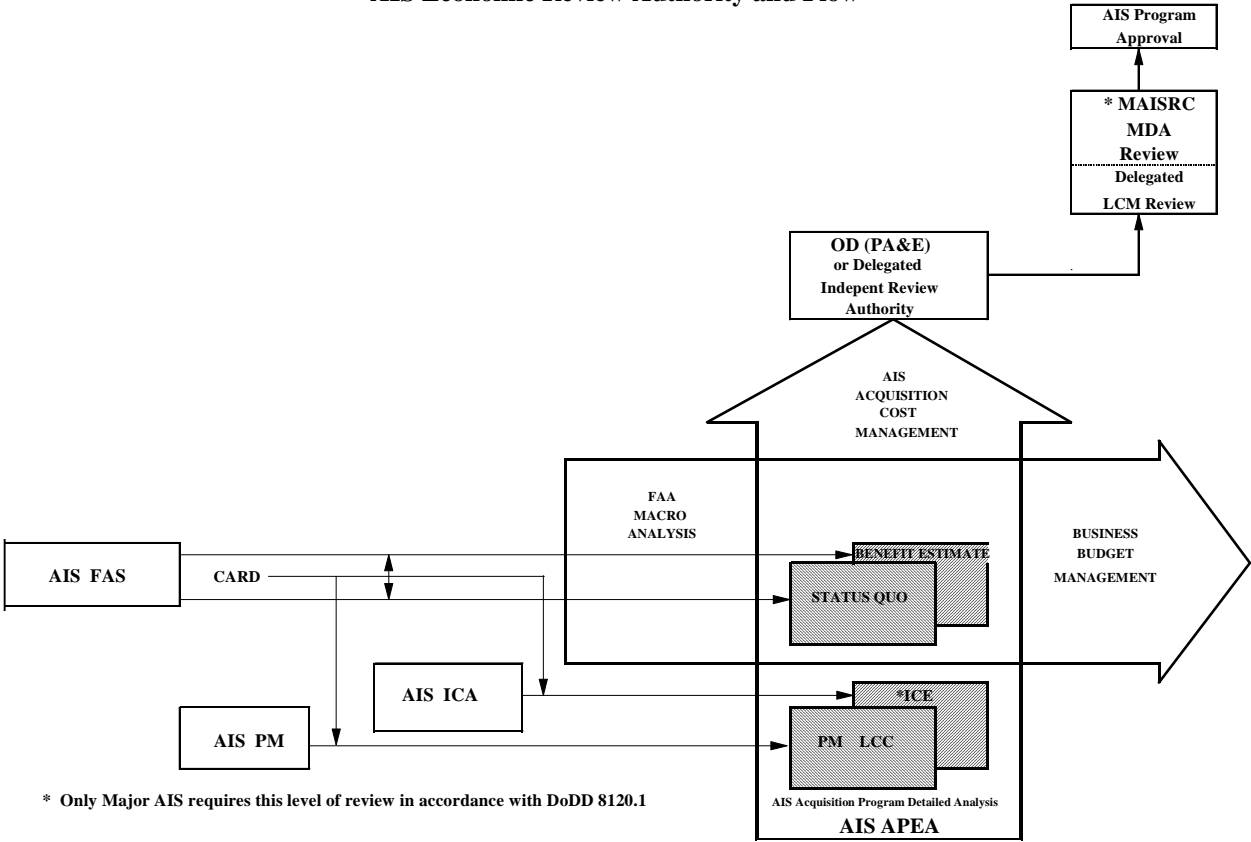
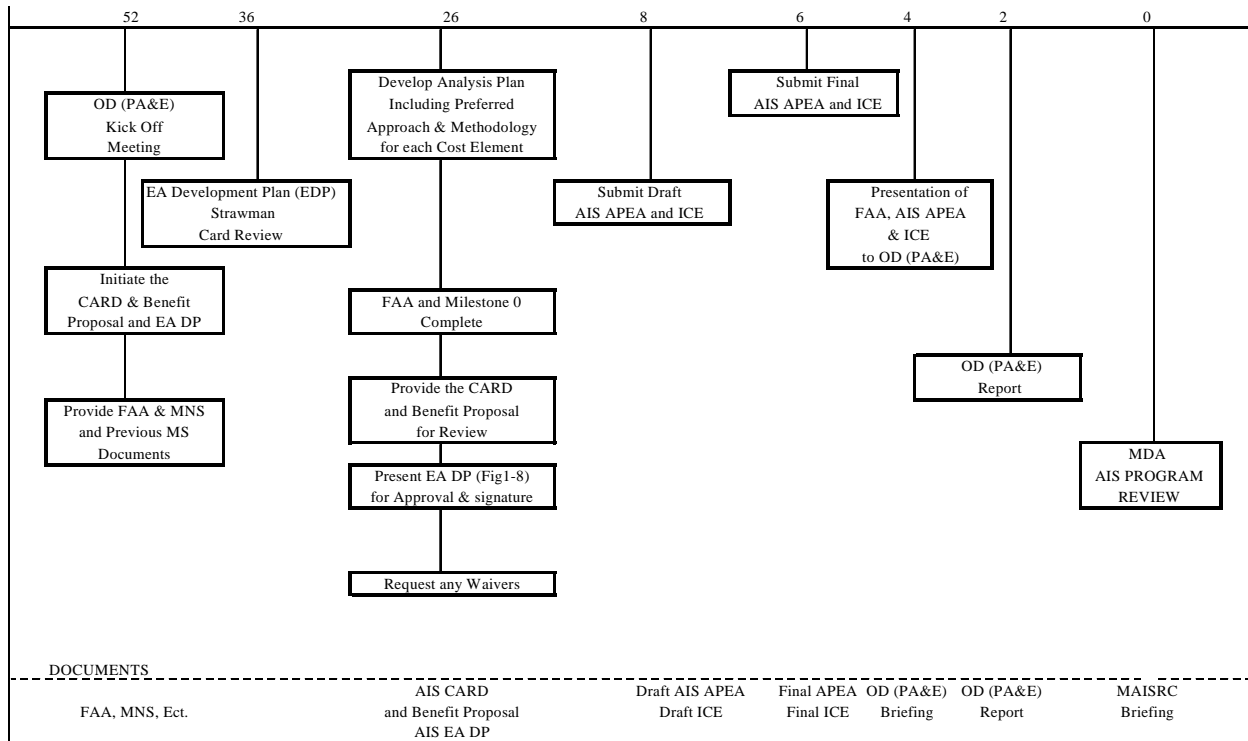


Figure 3-1

## Cost/Benefits Review Schedule

Weeks Before MAISRC Review



**Figure 3-2**

### AIS EA Presentation Outline and Requirement

	<b>RESPONSIBILITY</b>	<b>SECTION</b>	<b>TIME(MIN)</b>
I	Chair	<b>Opening Remarks</b>	5
II	Functional Sponsor & Program Manager	<b>Program Introduction</b> A. Functional Area/CIM/FAA B. Importance of Program: Statement of Need C. Mission Impact: MNS D. Alternatives: System Descriptions: AIS CARD E. Schedule, Milestones, Performance/Test Results F. Recommended Action and decision that will be required of the MAISRC, if applicable	20
III	PM Office	<b>AIS PM's Life Cycle Cost Estimate (APEA)</b> A. Background/Key Assumptions B. Analytical methodology by key cost elements: Results C. Risk Analysis by cost elements	20
IV	ICE Team	<b>Independent Cost Estimate of Preferred Alternative</b> A. Background/Key Assumptions B. Analytical methodology by key cost element: Results C. Risk Analysis by cost elements D. Comparison of Estimates	20
V	Functional Sponsor	<b>Reconciliation of Estimates</b>	10
VI	Functional Sponsor	<b>Benefits Analysis &amp; Correlation to reconciled estimate and Service POM or BES, whichever is later.</b>	15
VII	Functional Sponsor	<b>Conclusion/Recommendation</b>	5
VIII	All	<b>Questions/Answers</b>	10
IX	OD (PA&E)	<b>PA&amp;E Analysis Review/Comments</b>	10
X	Chair	<b>Chair Closing Comments</b>	5
<b>TOTAL</b>			<b>120</b>

**Figure 3-3**

## AIS Acquisition Program Economic Analysis

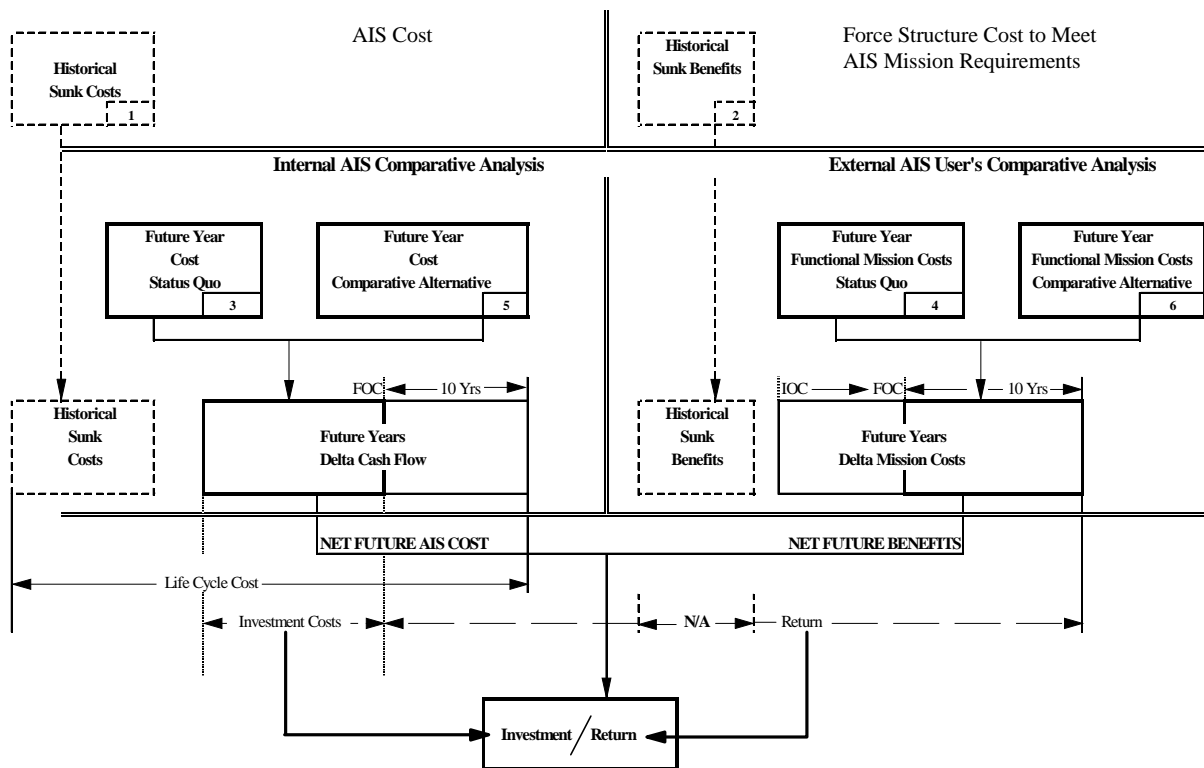


Figure 3-4

## Chapter 4

### **POM, BUDGET AND AIS EA INTERFACE**

**4.1 INTRODUCTION.** Not all life cycle costs are under the Program Manager's responsibility or control. Many elements are funded by other agencies, are outside the budget cycle, or occur after the system has been transferred to the users and the program office has been disbanded. Figure 4-1 shows this division of budget responsibility. In spite of this division of funding it is the PM's responsibility to accurately reflect these costs in his/her LCC estimate.

**4.2 AIS EA & BUDGET ESTIMATES.** It is essential that AIS APEA estimates and budget estimates be consistent. Relationships and interfaces between the estimate and the budget will be standardized in future changes to this guidance.



## Chapter 5

### **CONTRACTOR SUPPORT FOR DEPARTMENT OF DEFENSE AIS EA**

#### **5.1 CONTRACTOR SUPPORT FOR AIS APEA.**

Often, the skills necessary to perform AIS APEA are not available among the government staff available to the FAS. Further, these specialized EA skills may not be required on a continuing basis. It is often necessary, therefore, to acquire specialized contractor support for the development of the AIS APEA.

The AIS APEA is one of the principal tools used by the government in acquisition and resource allocation decisions. The results of the APEA may also be a determining factor in acquisition source selections. Since APEA is so closely tied to these inherently governmental functions, the contractors role in AIS APEA must be carefully limited. Contractors may be used to develop or use cost or benefit estimating tools, and they may apply those tools to develop estimates. Contractors may also compare costs and performance of various AIS program alternatives. Contractors may not, however, select the AIS program alternatives that will be pursued by the government, nor may contractors be involved in the presentation of the AIS APEA to AIS acquisition review authorities.

When contract support is used in the development of an AIS APEA, the contractor will not be permitted to:

- \* Participate in any study, research or analysis that may result in a conflict of interest. In particular, a contractor may not support any APEA where the knowledge gained through EA development might affect the outcome of a contract award by the government.
- \* Disclose or otherwise provide information gained through EA development to any agency outside the sponsoring government agency without the express written consent of the sponsoring agency.
- \* Provide any support, analysis, or recommendations with respect to the review or validation of an AIS by the independent review authorities. Prior to the use or assignment of contractors in APEA development, the contractor must:
  - a) Take all necessary measures to avoid any appearance or action that might affect directly a government acquisition source selection decision;
  - b) Provide a statement certifying the absence of any corporate or private interest in the AIS other than in the performance of the APEA;
  - c) Agree not to disclose information acquired through APEA development to individuals or organizations not involved in APEA development without the written approval of the FAS;
  - d) Provide evidence of sufficient internal corporate security procedures, plans, and controls to ensure the protection of the information entrusted to them by the government. Both non-disclosure and absence of conflict of interest statements must be signed by a responsible individual representing the contractor, and by each individual who has direct knowledge of or access to the information contained in the APEA.

**ATTACHMENT A to, DoD Automated Information System (AIS)  
Economic Analysis (EA) Guide**

**DoD  
AIS Economic Analysis  
Model**

**USER'S MANUAL**

**1 May 1995**

## USER'S MANUAL

**A.1 General.** The AIS Benefit/Cost Model is designed to facilitate the presentation and validation of the cost and benefit analyses while reducing redundant entries to the absolute minimum. Completion of the formats provides the single point of data entry required to support all Department AIS EA, including FEAs, and is required for every LCM Acquisition Review Authority review after Milestone 0.

This model neither replaces the process of Functional Economic Analysis (FEA) nor attempts to estimate costs and benefits. Rather, it provides a standard AIS EA input and display tool. Refer to DoD 8120.2M and the Guide/with attachments for the responsibilities, requirements, procedures and analytic techniques for AIS APEA.

**A.1.1 Overview.** This model addresses, specifically, the economic analysis and evaluation of Automated Information System (AIS) programs that are predominantly 1) supported by commercial-off-the-shelf hardware; and, 2) administrative in nature, i.e., support business processes that are not directly involved in the execution of field contingency operations. All AIS systems determined to fall under the purview of DoD 8000 series directives are considered to be predominantly administrative and, therefore, should be economically justified.

The analysis and evaluation of administrative AIS costs and benefits is critical to program Life Cycle Management approval and the prioritized allocation of funding. The purpose of the cost and benefits analysis is to explore and quantify the relative cost advantages of different concepts and design options (for example, the comparison of new and old systems and alternative maintenance and support policies). A fundamental AIS EA precept is that, in addition to being affordable, the most advantageous AIS alternative available to the Government should satisfy all critical mission requirements at the lowest LCC (in present value).

From a purely business economic perspective, administrative AIS acquisition programs should support at least a 10% Return On Investment (ROI) when compared to the existing Status Quo alternative. Return On Investment is the ratio of return to investment.

$$\text{ROI} = \text{Return} / \text{Investment}$$

Where:

**Investment** is the present value of the summed future annual net difference between the cost to maintain the Status Quo system until FOC would be attained by the proposed alternative (with minimum expenditures to sustain extant capability and no enhancements or upgrades regardless of approved funding or programming), versus the future cost to the Government to implement (attain FOC) operate and sustain a proposed alternative, including the cost to phase out the Status Quo.

**Return** is the present value of the summed future (from IOC through FOC +10) annual net difference between the force structure cost to meet critical mission requirements if the Status Quo system is maintained versus the future force structure cost to meet critical mission requirements if the proposed AIS alternative is implemented plus the costs identified as **Investment** from FOC+1 through FOC+10.

#### A.1.2 Single DoD EA Data Entry Spreadsheet (Model) Formats

This model provides details on required standard spreadsheet data entry formats. Data provided in AIS APEA formats provide the standard cost element structure and the single data entry point for AIS EA within the Department. In order to preclude duplication of data submission or submission of data in multiple formats, any DoD office or agency that requires AIS EA data will use the standard APEA spreadsheet formats provided in this model (when the data becomes available at or after AIS Milestone 1 approval).

A.1.3 Requirements. In order to run this model most efficiently it is recommended that the following minimum requirements be satisfied: (Note: The model was developed and is available in Excel 4.0a and 5.0. However, it can be down-loaded as Lotus 123 if required.)

1. A 386 SX-25MHZ Computer  
One 3.5" floppy drive  
DOS 4.0  
Mouse
2. 4 MB of RAM
3. Hard drive with 4.0 MB of available space for each alternative being considered
4. Windows 3.1 Software
5. Excel 4.0a Software
6. Laser Printer (300DPI)
7. A working knowledge of the Windows environment and the Excel 4.0 program. Note: Necessary instructions are available from OSD (PA&E), ext. (703) 696 9380 or 9385, as needed.

A.1.4 Set Up and Run Model. The model is composed of six disks. The first four contain input formats grouped by the office normally responsible for making the data entries (See Figure A-1), and the fifth contains the formats derived from those entries. It is not necessary to load the entire model in order to make these entries. Each disk can be loaded as a stand alone model for the purpose of making entries and preparing the necessary reports. The entire model is provided for the convenience of the user's and to show how the data entries interact with other reports being submitted by the various responsible agencies. If it is desired to load the entire model the following steps are suggested:

A.1.4.1 Create a directory. Create a directory on the hard drive for each alternative being considered, except Status Quo.

A.1.4.2 Load. Load the Input Formats and the Derived Formats disks into each directory. In order to maintain maximum flexibility in using the model and accommodate all degrees of expertise of the potential users, each Format is established as a separate file. (Experienced users may elect to combine these files into a workbook file.) This allows one Format (or many) to be loaded and worked at a time.

A.1.4.3 Delete. For all directories, except the Preferred Alternative directory, delete the following files: FORMAP, FORMBI, FORMBP, FORMC-1, FORMC-2, FORMCA, FORMCI, FORMDB, FORMEB, FORMFB, FORMHP, FORMJB and FORML.

Note: Do not remove the write protect feature from the 3.5" disks provided. Use these as master Format files to ensure that you can recover from inadvertent mistakes when entering data in your working files.

A.1.4.4 Labels. A file titled "Labels" is included in each disk (except #5, Derived Formats). This file is the master input file for the following data:

<u>Information</u>	<u>Cell</u>
a. Automated Information System Title	B3
b. Organization Accomplishing Estimate	B5
c. Year of Estimate	B7
d. Date of Economic Analysis	B9
e. Sunk Years	B11/12 - G11/12
f. Analyst's Name	B14
g. Analyst's Phone	B16
h. Future Years (to FOC)	B18/19 - O18/19
i. Future Years (Post FOC)	B21 - K21
j. Status Quo Title	B24
k. All Other Alternatives Title	B26
l. Discount Rate Factor	B30

A.1.4.5 AIS-SUM. A file titled "AIS-SUM" is included to summarize the functional area, the program description and the cost estimates. This file is submitted by the Program Office and is usually included in the Executive Summary of the EA report.

A.1.4.6 Charts. A file titled "Charts" is also included. In order to generate graphs for the Economic Analysis presentation the years included in the analysis must be displayed in continuous cells. This must be done manually since each analysis will have a different IOC and FOC. The program will then convert the dollars to the appropriate form for display. The totals for each year are copied as follows:

	Format	Row		"Charts" Cells
	A	476		F6 through K6 (done automatically)
	BA	114 & 231		L10 through AG10
<b><u>FROM</u></b>	BB	492 & 723	<b><u>TO</u></b>	L16 through AG16
	HA	11 & 57		L22 through AG22
	HB	11 & 57		L28 through AG28

**A.2 Spreadsheets.** Formats are divided into six disks (See Figure A-1): 1). FEAA Inputs Disk--those formats which are the responsibility of the functional area sponsor, 2). POE Input Disk--those formats which are the responsibility of the Program Office, 3). Budget Input Disk--the format reflecting the latest budget data, to be submitted by the Program Office, 4). ICE Input Disk-- the format which is the responsibility of the Independent Cost Agency, and 5). Derived Formats Disk--the formats which are derived from the input formats contained on Disks 1 through 4. The formats

provide the spread sheets for: current LCC estimate, comparison of the current and previous LCC estimates, comparison of the Program Manager's estimate and the ICE, comparison of the program's requirements and the budget, comparison of the status quo and the preferred alternative costs, current productivity impacts and benefits, comparison of the current and previous estimates of benefits, and the estimate of the Return On Investment (ROI).

An outline of the information data flow of the formats and their inter-connectivity is shown in Figures A-2 through A-6. Separate directories are required for each alternative. The sample formats included as examples are those required for the Status Quo and the Preferred Alternative.

The 0s shown on the spreadsheets are the results of formulas and linkages which are embedded in the disks. They do not require input but may be overwritten if appropriate to reflect a higher level of detail. Care must be taken when making changes to the files to ensure the formulas and linkages remain valid.

Each format is a separate EXCEL file. These disks contain linkages of each spreadsheet so that transfers of data from the single entry point to all the applications of the data and all formats is done automatically. Note that Excel updates the data only to the immediate previous linked spreadsheet. Therefore, when data is changed make sure the spreadsheets are updated sequentially. For example, Format HA1 is linked to HA and HA is linked to Format K. A change to HA1 will not change K without first loading and updating HA. Supplemental formats may be necessary depending on the dictates of a particular system and to highlight areas of concern. In addition, greater levels of detail may be desirable in reflecting parts of the Cost Element Structure (CES). The use of additional, supplemental formats is encouraged, but each supplemental format should show the linkage to one of the specified formats. Assistance in developing this linkage is available from OD (PA&E), if requested.

## Disk Formats

**1st Letter Indicates:  
Format**

**2nd Letter Indicates:**  
**A** - Status Quo  
**B** - Preferred Alternative  
**P** - Previous Estimate  
**I** - Independent Estimate

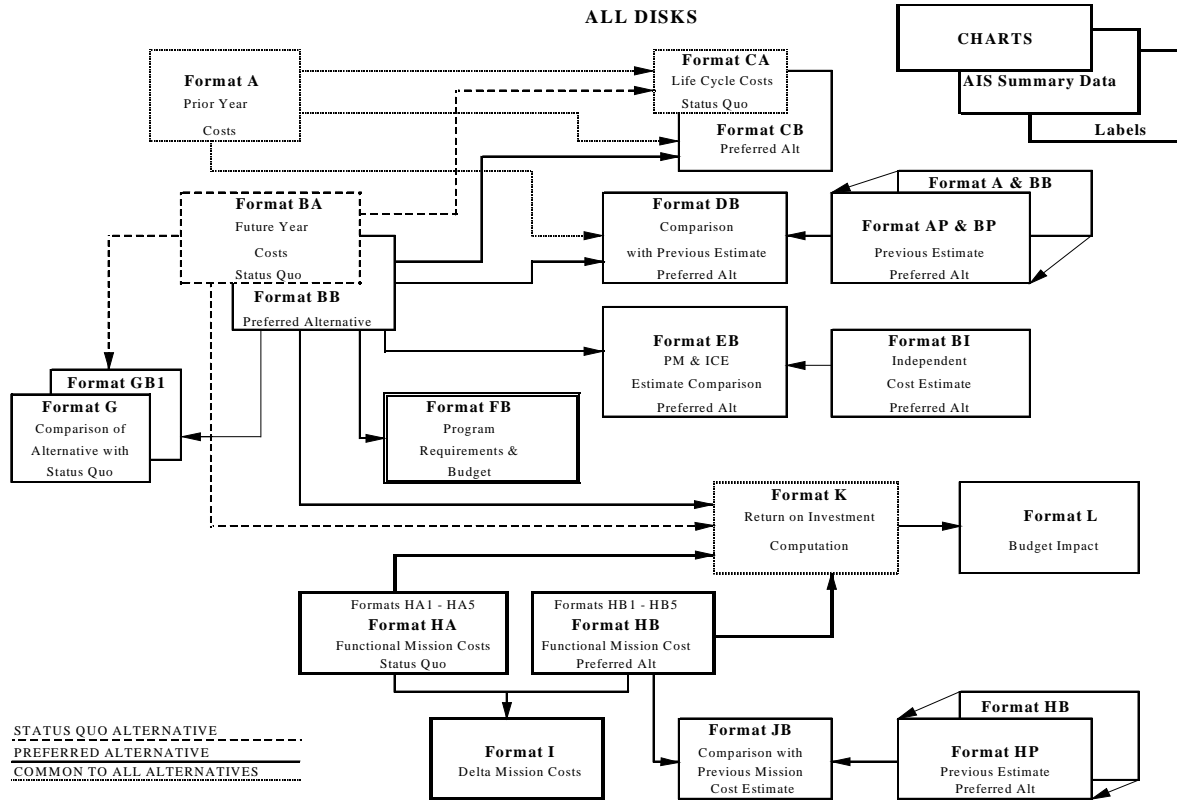
**3rd Digit Indicates:**  
**1** - Army  
**2** - Navy  
**3** - Marines  
**4** - Air Force  
**5** - Other DoD

<div><div>DISK 1</div><div>FEAA INPUT FORMATS</div><table><tr><td>Labels (Input Format)</td><td>LABELS</td></tr><tr><td>Prior Year Costs</td><td>A</td></tr><tr><td>Future Year Costs, Status Quo</td><td>BA</td></tr><tr><td>Functional Mission Costs, Status Quo - Army</td><td>HA1</td></tr><tr><td>Functional Mission Costs, Status Quo - Navy</td><td>HA2</td></tr><tr><td>Functional Mission Costs, Status Quo - Marines</td><td>HA3</td></tr><tr><td>Functional Mission Costs, Status Quo - Air Force</td><td>HA4</td></tr><tr><td>Functional Mission Costs, Status Quo - Other DoD</td><td>HA5</td></tr><tr><td>Functional Mission Costs, Alternative - Army</td><td>HB1</td></tr><tr><td>Functional Mission Costs, Alternative - Navy</td><td>HB2</td></tr><tr><td>Functional Mission Costs, Alternative - Marines</td><td>HB3</td></tr><tr><td>Functional Mission Costs, Alternative Quo - Air Force</td><td>HB4</td></tr><tr><td>Functional Mission Costs, Alternative - Other DoD</td><td>HB5</td></tr></table></div>	Labels (Input Format)	LABELS	Prior Year Costs	A	Future Year Costs, Status Quo	BA	Functional Mission Costs, Status Quo - Army	HA1	Functional Mission Costs, Status Quo - Navy	HA2	Functional Mission Costs, Status Quo - Marines	HA3	Functional Mission Costs, Status Quo - Air Force	HA4	Functional Mission Costs, Status Quo - Other DoD	HA5	Functional Mission Costs, Alternative - Army	HB1	Functional Mission Costs, Alternative - Navy	HB2	Functional Mission Costs, Alternative - Marines	HB3	Functional Mission Costs, Alternative Quo - Air Force	HB4	Functional Mission Costs, Alternative - Other DoD	HB5	<div><div>DISK 3</div><div>BUDGET INPUT DISK</div><table><tr><td>Labels (Input Format)</td><td>LABELS</td></tr><tr><td>Program Requirements &amp; Budget Comparison</td><td>FB</td></tr></table></div>	Labels (Input Format)	LABELS	Program Requirements & Budget Comparison	FB	<div><div>DISK 5</div><div>DERIVED FORMATS</div><table><tr><td>Life Cycle Costs - Preferred Alt</td><td>C-1</td></tr><tr><td>Life Cycle Costs - Preferred Alt</td><td>C-2</td></tr><tr><td>Life Cycle Costs - Status Quo</td><td>CA</td></tr><tr><td>Life Cycle Costs - Preferred Alt</td><td>CB</td></tr><tr><td>Life Cycle Costs Comparison</td><td>DB</td></tr><tr><td>Current &amp; Previous</td><td></td></tr><tr><td>Future Costs Comparison - Preferred Alt</td><td>EB</td></tr><tr><td>POE and ICE</td><td></td></tr><tr><td>Delta Costs - Alternative less Status Quo</td><td>G</td></tr><tr><td>Delta Costs - Alternative less Status Quo</td><td>GB1</td></tr><tr><td>Summary - Functional Area Cost Change - Status Quo</td><td>HA</td></tr><tr><td>Summary - Functional Area Cost Change - Preferred Alt</td><td>HB</td></tr><tr><td>Delta - Functional Area Mission Costs</td><td>I</td></tr><tr><td>Preferred Alt less Status Quo</td><td></td></tr><tr><td>Functional Area Mission Costs Comparison</td><td>JB</td></tr><tr><td>Current &amp; Previous</td><td></td></tr><tr><td>Return on Investment</td><td>K</td></tr><tr><td>Budget Impact</td><td>L</td></tr></table></div>	Life Cycle Costs - Preferred Alt	C-1	Life Cycle Costs - Preferred Alt	C-2	Life Cycle Costs - Status Quo	CA	Life Cycle Costs - Preferred Alt	CB	Life Cycle Costs Comparison	DB	Current & Previous		Future Costs Comparison - Preferred Alt	EB	POE and ICE		Delta Costs - Alternative less Status Quo	G	Delta Costs - Alternative less Status Quo	GB1	Summary - Functional Area Cost Change - Status Quo	HA	Summary - Functional Area Cost Change - Preferred Alt	HB	Delta - Functional Area Mission Costs	I	Preferred Alt less Status Quo		Functional Area Mission Costs Comparison	JB	Current & Previous		Return on Investment	K	Budget Impact	L
Labels (Input Format)	LABELS																																																																			
Prior Year Costs	A																																																																			
Future Year Costs, Status Quo	BA																																																																			
Functional Mission Costs, Status Quo - Army	HA1																																																																			
Functional Mission Costs, Status Quo - Navy	HA2																																																																			
Functional Mission Costs, Status Quo - Marines	HA3																																																																			
Functional Mission Costs, Status Quo - Air Force	HA4																																																																			
Functional Mission Costs, Status Quo - Other DoD	HA5																																																																			
Functional Mission Costs, Alternative - Army	HB1																																																																			
Functional Mission Costs, Alternative - Navy	HB2																																																																			
Functional Mission Costs, Alternative - Marines	HB3																																																																			
Functional Mission Costs, Alternative Quo - Air Force	HB4																																																																			
Functional Mission Costs, Alternative - Other DoD	HB5																																																																			
Labels (Input Format)	LABELS																																																																			
Program Requirements & Budget Comparison	FB																																																																			
Life Cycle Costs - Preferred Alt	C-1																																																																			
Life Cycle Costs - Preferred Alt	C-2																																																																			
Life Cycle Costs - Status Quo	CA																																																																			
Life Cycle Costs - Preferred Alt	CB																																																																			
Life Cycle Costs Comparison	DB																																																																			
Current & Previous																																																																				
Future Costs Comparison - Preferred Alt	EB																																																																			
POE and ICE																																																																				
Delta Costs - Alternative less Status Quo	G																																																																			
Delta Costs - Alternative less Status Quo	GB1																																																																			
Summary - Functional Area Cost Change - Status Quo	HA																																																																			
Summary - Functional Area Cost Change - Preferred Alt	HB																																																																			
Delta - Functional Area Mission Costs	I																																																																			
Preferred Alt less Status Quo																																																																				
Functional Area Mission Costs Comparison	JB																																																																			
Current & Previous																																																																				
Return on Investment	K																																																																			
Budget Impact	L																																																																			
<div><div>DISK 2</div><div>POE INPUT DISK</div><table><tr><td>Labels (Input Format)</td><td>LABELS</td></tr><tr><td>AIS Summary Sheet</td><td>AIS-SUM</td></tr><tr><td>Future Year Costs - Preferred Alternative</td><td>BB</td></tr><tr><td>Sunk Costs - Previous Submission</td><td>(AP)</td></tr><tr><td>Future Year Costs - Preferred Alt - Previous Submission</td><td>(BP)</td></tr><tr><td>Functional Mission Costs, Preferred Alt - Previous Sub</td><td>(HP)</td></tr><tr><td>Charts</td><td>CHARTS</td></tr></table></div>	Labels (Input Format)	LABELS	AIS Summary Sheet	AIS-SUM	Future Year Costs - Preferred Alternative	BB	Sunk Costs - Previous Submission	(AP)	Future Year Costs - Preferred Alt - Previous Submission	(BP)	Functional Mission Costs, Preferred Alt - Previous Sub	(HP)	Charts	CHARTS	<div><div>DISK 4</div><div>ICE INPUT DISK</div><table><tr><td>Labels (Input Format)</td><td>LABELS</td></tr><tr><td>Future Costs - Preferred Alt - Independent</td><td>BI</td></tr><tr><td>Cost Estimate</td><td></td></tr></table></div>	Labels (Input Format)	LABELS	Future Costs - Preferred Alt - Independent	BI	Cost Estimate																																																
Labels (Input Format)	LABELS																																																																			
AIS Summary Sheet	AIS-SUM																																																																			
Future Year Costs - Preferred Alternative	BB																																																																			
Sunk Costs - Previous Submission	(AP)																																																																			
Future Year Costs - Preferred Alt - Previous Submission	(BP)																																																																			
Functional Mission Costs, Preferred Alt - Previous Sub	(HP)																																																																			
Charts	CHARTS																																																																			
Labels (Input Format)	LABELS																																																																			
Future Costs - Preferred Alt - Independent	BI																																																																			
Cost Estimate																																																																				

( ) Input from previous submission

**Figure A-1**

## AIS Cost Analysis Model Spreadsheet Flow Diagram

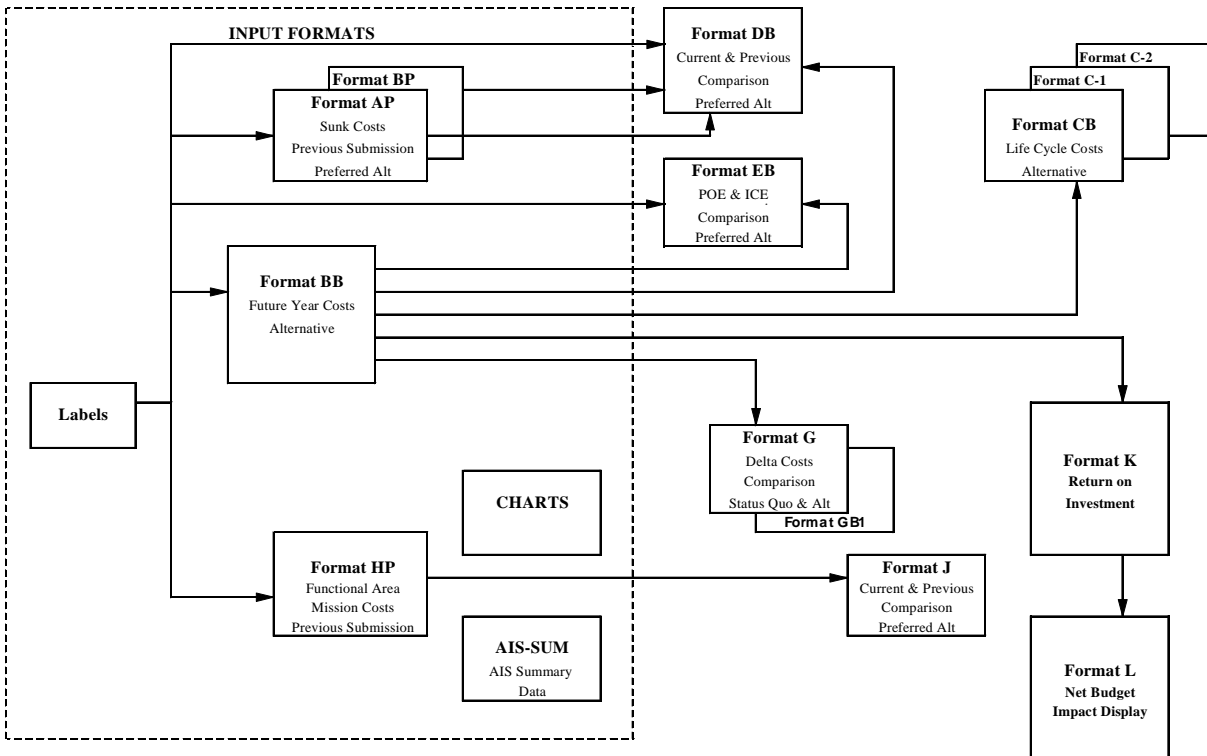


**Figure A-2**

The flowchart illustrates the Data Integration and Analysis (DIA) process, starting from 'Labels' and branching into three main paths. The top path, enclosed in a dashed box labeled 'INPUT FORMATS', includes 'Format A' (Prior Year Costs), 'Format BA' (Future Year Costs, Status Quo), and a stack of 'Format HA' (Functional Area, Mission Costs, Status Quo - Army) formats (HA1, HA2 Navy, HA3 Marines, HA4 Air Force, HA5 Other DoD). The middle path includes 'Format HA' (Functional Area, Mission Costs, Status Quo - Summary), 'Format I' (Delta - Functional Area, Mission Costs, Status Quo & Alt), 'Format HB' (Functional Area, Mission Costs, Alternative - Summary), and 'Format JB' (Comparison with Previous Mission, Cost Estimate). The bottom path includes 'Format K' (Return on Investment) and 'Format L' (Net Budget, Impact Display). Arrows indicate the flow of data from the input formats through various processing steps to the final output formats.

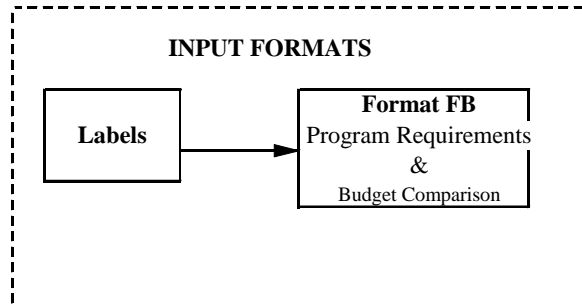
35

**AIS Cost Analysis Model  
Spreadsheet Flow Diagram  
Disk 2 - POE Input Disk**



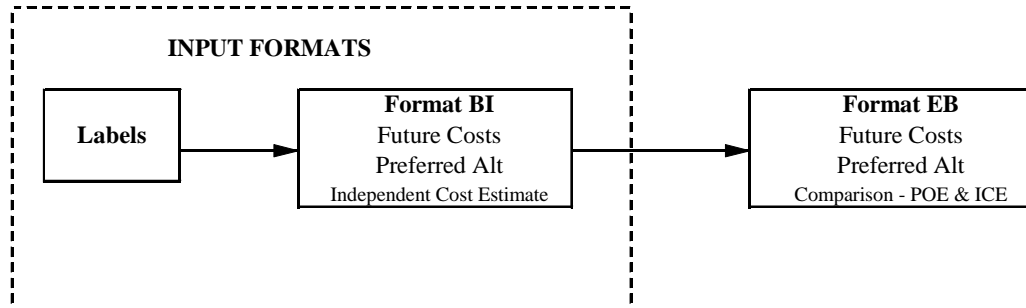
**Figure A-4**

**AIS Cost Analysis Model  
Spreadsheet FlowDiagram  
Disk 3 - Budget Input Disk**



**Figure A-5**

**AIS Cost Analysis Model  
Spreadsheet Flow Diagram  
Disk 3 - Budget Input Disk**



**Figure A-6**

## **ATTACHMENT B to, DoD Automated Information System (AIS) Economic Analysis (EA) Guide**

### **Cost Element Structure Definitions**

#### **B-1 Cost Element Structure**

This Cost Element Structure (CES) provides a standard vocabulary for the identification and classification of cost elements to be used with cost analyses which will facilitate program review, reduce redundant staff actions and provide the framework for the development of specific program cost estimates. Any CES, to be useful, must be designed to answer specific questions for a manager, be applicable to many requirements, such as program reviews and budget submissions, be applicable at program inception through disposal and include all costs which will be incurred by the Government in designing, developing and operating the system through out its life cycle. The cost element structure is to be used for all AISs undergoing DoD review. It may be augmented to meet individual program requirements when greater levels of details are necessary. All of the cost elements indicated in this enclosure must be included in LCC estimates submitted to OD (PA&E). Do not double count costs that could be included in more than one cost element. This is particularly important for logistics support costs which could be included in either the investment or O&S areas. In some cases this CES contains built-in redundancies that permit options for display. Some of the cost elements in the CES may not be applicable to every AIS program. The specific CES appropriate for each program reviewed by OD (PA&E) should be established in the meeting described in the Guide, chapter 1, **paragraph 1.3.3.3.1.**

The CES is hierarchical in nature to accommodate programs in early development, when little detailed data is available, through deployment, when detailed data is available at lower levels of indenture. As shown in figures B-1 through B-5 all sub-elements of each indenture level are summed to the next higher level of the cost element, and therefore, as more details become known of the system the greater detail can be added without reaccomplishing the entire CES.

The Cost Element Structure is designed to provide standardization and comparability between AISs and to facilitate the validation process. If an actual expenditure or anticipated estimated cost does not fit any of the definitions provided select a cost element that most closely defines the actual cost element and provide a changed definition of that cost element in the backup documentation. Actual costs which fit the definitions provided need not be redefined in the documentation.

### **COST ELEMENT STRUCTURE FOR AIS ECONOMIC ANALYSIS**

#### **1.0 Investment**

This major element includes all costs to the government to implement, fully, at all required operational sites, the automated information system required to achieve and initially sustain Full Operational Capability (FOC) and the operational and economic return on investment estimated in the AIS benefit analysis and Functional Economic Analysis (FEA). Costs are attributable to the AIS program from the time of program initiation through the complete fielding, implementation and testing required to meet FOC requirements. Phase out of the Status Quo AIS (if any) and Operating costs after FOC are excluded from this cost element. This phase includes cost elements from the beginning of the program through purchases of operational ADP systems, upgrades to the system in order to satisfy the approved requirements, and other initial items (e.g., initial training, spares, supplies, etc.). Also included are the elements to implement the ADP system, such as implementation and acceptance team testing, facility construction costs, and site activation, upgrades

and disposal costs or reuse credits. It includes the direct investments of the program, as well as, those investments made by a central facility or Mega Center to support the AIS being estimated.

### **1.1 Program Management**

The program management element is defined as the business and administrative planning, organizing, directing, coordination, controlling, and approval actions designated to accomplish overall program objectives which are not associated with specific hardware elements and are not included in systems engineering. Examples of these activities are: 1) Cost, schedule, performance measurement management, warranty administration, contract management, data management, vendor liaison, subcontract management, etc., and 2) Initial Logistics Support (ILS) element management defined as the logistics tasks management effort and technical control, and the business management of the elements of ILS. The logistics management function encompasses the Integrated Support Plan, ILS Management Team (ILSMT) participation, ILS evaluation and supportability assurance required to produce an affordable and supportable defense materiel system. This element includes the planning and management of all the functions of logistics and logistic support analysis, e.g., maintenance support planning; support facilities planning; other ILS requirements determination; support equipment; supply support; Packaging, Handling, Storage, and Transportation (PHST); provisioning requirements determination and planning; training system requirements determination; computer resource determination; organizational, intermediate, and depot maintenance determination; and data management.

#### **1.1.1 Personnel**

This cost element includes the direct activities of persons performing program management functions such as Program Manager, Program Control Officer, and program manager's staff and staff support. Their costs will be accumulated in the following appropriate categories:

##### **1.1.1.1 Military**

##### **1.1.1.2 Civilian**

##### **1.1.1.3 Contractor**

#### **1.1.2 TDY**

This cost element includes the travel costs (i.e., transportation, per diem, etc.) of persons in the program management function as they conduct program related trips, to include contractor travel.

#### **1.1.3 Other Government Support**

This cost element covers any indirect government personnel or other support related to program management and will be accumulated in the categories below:

##### **1.1.3.1 Military**

##### **1.1.3.2 Civilian**

##### **1.1.3.3 Other**

#### **1.1.4 Other**

This element covers any program management costs not covered in the other categories and may include such things as supplies, equipment, facilities, leasing, studies, contract management support, etc.

## **1.2 Concept Exploration**

The Concept Exploration element is defined as all costs associated with the study, analysis, design development, and test involved in investigating alternative methods of delivering prototype(s) or end item(s) to fulfill a requirement.

### **1.2.1 Engineering Analysis and Specifications**

This cost element contains the technical and management efforts of directing and controlling a totally integrated engineering effort of a system or program. The element encompasses the systems engineering effort to define system alternatives and associated integrated planning and control of the technical program efforts of design engineering, specialty engineering, production engineering, and integrated test planning. This element includes but is not limited to : the systems engineering efforts to transform an operational need or statement of deficiency into a description of system requirements and a preferred system configuration; and the technical planning and control effort for planning, monitoring, measuring, evaluating, directing and re the management of the technical program. It specifically excludes the actual design engineering and the production engineering directly related to the CES element with which it is associated. For specific engineering efforts to include, consult MIL-STD-881B. The costs will be accumulated in the categories below:

#### **1.2.1.1 Military**

#### **1.2.1.2 Civilian**

#### **1.2.1.3 Contractor**

### **1.2.2 Concept Exploration Hardware**

This cost element includes costs incurred to acquire, lease, or modify all hardware necessary to design, engineer and modify hardware components, including GFE, as required to support Concept Exploration. All costs associated with determining possible prototype alternative hardware configurations are captured in this element, but not the costs of acquiring such hardware (See CES 1.3.2.1).

### **1.2.3 Concept Exploration Software**

This cost element includes all costs incurred to acquire or lease all software necessary to design, engineer and modify software for a system in direct support of determining possible system (prototype) alternative concepts, including GFE. Costs for software which are acquired or modified for the development effort, including prototype efforts, should be included in element 1.3.2.2.

#### **1.2.3.1 COTS**

This cost element includes any expense required to purchase, lease or otherwise acquire any commercial-off-the-shelf (COTS) software necessary for Concept Exploration.

#### **1.2.3.2 Other Software**

This cost element includes any expense required to purchase, lease or otherwise acquire any non-commercial software necessary for Concept Exploration.

#### **1.2.3.3 Software Exploration**

This cost element includes any labor expense required to modify or further develop any software in the support of the exploration of software (prototype) alternatives concepts.

**1.2.3.3.1 Military**

**1.2.3.3.2 Civilian**

**1.2.3.3.3 Contractor**

**1.2.4 Concept Exploration Data**

This cost element includes the cost to purchase, lease or develop data in support of the concept exploration of all system alternatives.

**1.2.4.1 Data Acquisition**

This cost element includes the cost to purchase, lease or otherwise acquire data required to support concept exploration.

**1.2.4.2 Data Exploration**

This cost element includes the labor cost associated with collecting, analyzing, transitioning and distributing data required to support concept exploration. Accumulate costs in the following appropriate categories.

**1.2.4.2.1 Military**

**1.2.4.2.2 Civilian**

**1.2.4.2.3 Contractor**

**1.2.5 Documentation**

This cost element includes the cost of preparation, revision, and reproduction of drawings, test plans, testing procedures, manuals and other system documentation in support of the concept exploration.

**1.2.5.1 Documentation Acquisition**

This cost element includes the cost to purchase, lease or otherwise acquire documentation required to support concept exploration.

**1.2.5.2 Documentation Exploration**

This cost element includes the labor cost associated with collecting, analyzing, transitioning and distributing documentation required to support concept exploration. Accumulate costs in the appropriate categories below.

**1.2.5.2.1 Military**

**1.2.5.2.2 Civilian**

**1.2.5.2.3 Contractor**

**1.2.6 Concept Exploration Testing**

This cost element includes testing activities associated with the use specially fabricated hardware to obtain or validate engineering data on the performance of the system during the investment/development phase of the program. This element includes the detailed planning, conduct, support, data reduction and reports from such testing, and all hardware/software items which are

consumed, or planned to be consumed, in the conduct of such testing. It also includes all costs associated with the design and production of models, specimens, fixtures, and instrumentation in support of the test program. Test articles which are complete units (i.e. functionally configured as required by specifications) are excluded from this element and should be included in CES 1.4. All formal and informal testing up through the subsystem level which can be associated with the hardware/software element are excluded. Acceptance testing is also excluded. These efforts are to be included with the appropriate hardware software elements.

#### **1.2.6.1 Testing Acquisition**

This cost element includes the cost to purchase, lease or otherwise acquire testing required to support concept exploration.

#### **1.2.6.2 Testing Development**

This cost element includes the labor cost associated with conducting, collecting data and analyzing tests required to support concept exploration. Accumulate costs in the appropriate categories below.

##### **1.2.6.2.1 Military**

##### **1.2.6.2.2 Civilian**

##### **1.2.6.2.3 Contractor**

#### **1.2.7 Facilities**

This cost element includes all costs incurred in the construction, modification and/or leasing of facilities required to support concept exploration for the automated information management system and/or testing the prototype.

#### **1.2.8 Other (Logistical Support, Environmental, etc., as required)**

This cost element includes any costs and support required to support concept exploration.

### **1.3 Development**

This cost element includes all resource expenditures required to develop and prototype the alternative.

#### **1.3.1 System Design and Specification**

This cost element reflects the activities of personnel involved in designing/improving the automation information system as well as any supplies consumed during the development.

##### **1.3.1.1 Personnel**

This cost element reflects labor costs required for the design, development and improvement of the alternative system.

##### **1.3.1.1.1 Military**

##### **1.3.1.1.2 Civilian**

##### **1.3.1.1.3 Contractor**

##### **1.3.1.2 Other**

This cost element includes any administrative design/improvement engineering support costs not covered in the categories above and may include such things as facilities, equipment and supplies.

### **1.3.2 Development, Prototype and Test Site Investment**

This cost element includes costs incurred to acquire, lease, or modify all hardware and software necessary to design, engineer, develop, test, and modify hardware components of the system in this phase, including GFE.

#### **1.3.2.1 Development Hardware Investment**

This cost element includes the lease, purchase or modification of NDI hardware to facilitate the development phase of the alternative.

##### **1.3.2.1.1 Test Site**

##### **1.3.2.1.2 Development Support**

##### **1.3.2.1.3 Modification**

##### **1.3.2.1.4 Prototype**

#### **1.3.2.2 Development Software Investment**

This cost element includes the lease, purchase, or modification of COTS products required to facilitate the development effort. Costs will be accumulated in the appropriate categories which follow.

##### **1.3.2.2.1 General Administration**

##### **1.3.2.2.2 Operating Systems**

##### **1.3.2.2.3 Communications**

##### **1.3.2.2.4 DBMS**

##### **1.3.2.2.5 Tools**

##### **1.3.2.2.6 Other (License)**

### **1.3.3 Software Development**

#### **1.3.3.1 Commercial Off-the-Shelf (COTS) Modification**

This cost element includes the cost of acquiring applications software, including all of the lease, purchase, and modification costs. It also includes all applications and utility software development, other than communications-specific software, that is required to integrate the COTS products into a total systems environment. Categorize all software development personnel requirements into military, civilian or contractor.

##### **1.3.3.1.1 Military**

##### **1.3.3.1.2 Civilian**

##### **1.3.3.1.3 Contractor**

#### **1.3.3.2 Application/Mission Software (Non COTS)**

This cost element describes all costs required to develop deliverable line of application software. This might include the lease, purchase, or modification of products which assist in the planning, designing, testing, de-bugging, validating, and documenting the application software necessary to automate a specific function or operation and integrate that function into the overall AIS.

When converting an AIS from an old system to a new system, software development costs should reflect the amount of code to be transferred without modification, transferred with minor modification, bridged, redesigned, and eliminated. For contractor developed software include all program management, G&A, and other contractor related costs. For organic software development, fully burdened labor rates should be used and placed in the appropriate labor category.

**1.3.3.2.1 Military**

**1.3.3.2.2 Civilian**

**1.3.3.2.3 Contractor**

**1.3.3.3 Communications Software Development/Modification**

This cost element contains all costs for software to establish the connectivity required by the specific system.

**1.3.3.3.1 Military**

**1.3.3.3.2 Civilian**

**1.3.3.3.3 Contractor**

**1.3.4 System Documentation**

This cost element captures the costs associated with various system documentation requirements which follow. Accumulate the costs in the appropriate categories below.

**1.3.4.1 Military**

**1.3.4.2 Civilian**

**1.3.4.3 Contractor**

**1.3.4.3.1 Technical Publications**

This cost element includes data which provides instruction for the installation, operation, maintenance, training, and support of a system or equipment which is formatted into a technical manual. A technical manual normally includes operation and maintenance instructions, parts list or parts breakdown, and related technical information or procedures exclusive of administrative procedures. This data may be presented in any form, regardless of the form or method of recording.

**1.3.4.3.2 Engineering Data**

This cost element describes the cost of recorded information, regardless of the form or method of recording, of a scientific or technical nature, including computer software documentation. Engineering data does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. engineering data is required to define and document an engineering design or product configuration, sufficient to allow duplication of the original items, and is used to support production, engineering and logistics activities. This element includes, for example, all final plans, procedures, reports, and documentation pertaining to systems, subsystems, computer and computer resource availability and maintainability, and other engineering analysis, etc. A technical data package (re-procurement package) includes all engineering drawings, associated lists, process descriptions, and other documents which define the physical geometry, material composition, and performance procedures.

**1.3.4.3.3 Management Data**

This cost element describes data items necessary for configuration management, cost, schedule, contractual data management, program management, etc., required by the government. This element includes contractor cost reports, cost performance reports, contractor fund status reports, schedules, milestone, networks, integrated support plans, etc.

#### **1.3.4.3.4 Support Data**

This cost element includes data items designed to document the support planning. This element includes, for example, LSA documentation and LSA record maintenance and delivery, supply, general maintenance plans and reports, training data, transportation, handling, packaging information, facilities data, data to support the provisioning process and all other support data and software supportability planning and software support transition planning documents.

### **1.3.5 Data Development and Transition**

This cost element captures the costs for all labor associated with a variety of data types and includes all cost to design the logical data model to support the applications; DBMS requirements analysis; file design; data standardization and configuration management; data transiting, conversion and migration; and data validation. Include all costs associated with the requirements for conforming with DoD data standards or participation in activity for the DoD data element dictionary development. CES 1.3.5.4 includes COTS DBMS license costs to support the application development. Costs will be accumulated in the appropriate categories below.

#### **1.3.5.1 Military**

#### **1.3.5.2 Civilian**

#### **1.3.5.3 Contractor**

#### **1.3.5.4 COTS DBMS**

### **1.3.6 Data Base Standards and Dictionary**

This cost element captures the costs for all labor associated with the development of data base definition standards and a single data base dictionary to support multiple applications, functional disciplines and operational (service) units, that will be supported, in an integrated fashion, by the alternative AIS.

#### **1.3.6.1 Military**

#### **1.3.6.2 Civilian**

#### **1.3.6.3 Contractor**

#### **1.3.6.4 Other**

### **1.3.7 Training Development**

This cost element aggregates the cost of training development/delivery personnel and the equipment and aids the personnel must use in their development/delivery efforts. Include all non-labor costs incurred in developing appropriate training services, devices, accessories, aids and equipment used to facilitate instruction through which personnel will acquire sufficient concepts, skills and aptitudes to operate and maintain the AIS and facilitate follow on and recurring training. (Training for the trainers)

#### **1.3.7.1 Military**

#### **1.3.7.2 Civilian**

### **1.3.7.3 Contractor**

### **1.3.7.2 Other**

## **1.3.8 Test and Evaluate**

This cost element aggregates the costs for the various types of testing which occur in the development effort.

### **1.3.8.1 Development Test and Evaluation**

This cost element describes the test and evaluation conducted to : (a) demonstrate that the engineering design and development process is complete; (b) demonstrates that the design risks have been minimized; (c) demonstrate that the system will meet specifications; (d) estimates the system's military utility when introduced; (e) determine whether the engineering design is supportable for operational use; (f) provide test data with which to examine and evaluate trade-offs against specification requirements, life-cycle cost, and schedule; and (g) perform the logistics testing efforts to evaluate the achievement of supportability goals, the adequacy of the support package for the system, (e.g., deliverable maintenance tools, test equipment, technical publications, maintenance instructions, and personnel skills and training requirements, etc.). development test and evaluation includes all contractor and in-house effort and is planned, conducted and monitored by the developing agency of the DoD Component. The Other category below is for costs representing supplies and hardware items consumed during the testing period.

#### **1.3.8.1.1 Military**

#### **1.3.8.1.2 Civilian**

#### **1.3.8.1.3 Contractor**

#### **1.3.8.1.4 Other**

### **1.3.8.2 Independent Verification and Validation**

This cost element reflects those costs incurred for the independent testing of the alternative. The Other category is for supplies and hardware consumed during the testing period.

#### **1.3.8.2.1 Military**

#### **1.3.8.2.2 Civilian**

#### **1.3.8.2.3 Contractor**

#### **1.3.8.2.4 Other**

### **1.3.8.3 Operational Test and Evaluation**

This cost element describes the test and evaluation conducted by agencies other than the developing command to assess the prospective systems military utility, operational effectiveness, operational suitability, logistics supportability, cost of ownership, and need for any modifications. Initial operation test and evaluation conducted during the development of an AIS will be included in this element. This element encompasses such tests as system demonstration, qualification operational test and evaluation, etc., and support thereto, required to prove the operational capability of the deliverable system. It includes contractor support consumed during this phase of the testing. It also includes performing the logistics testing efforts to evaluate the achievement of supportability goals and the adequacy of the support for the system. The other category is for costs of supplies and hardware items consumed during the test period.

- 1.3.8.3.1 Military**
- 1.3.8.3.2 Civilian**
- 1.3.8.3.3 Contractor**
- 1.3.8.3.4 Other**

### **1.3.9 Logistical Support Development**

This cost element includes all costs incurred in completing the development of logistics plans (ILSP & LSMP) and services, through which logistical support will be available when necessary to support operation of the automated information system. Includes all labor and non-labor costs associated with developing logistical support for this phase of the program.

- 1.3.9.1 Military**
- 1.3.9.2 Civilian**
- 1.3.9.3 Contractor**
- 1.3.9.4 Other**

### **1.3.10 Facilities**

This cost element includes all costs incurred in the construction and modification of facilities required to support development of the automated information management system and/or testing the prototype.

### **1.3.11 Environmental**

This cost element includes all costs associated with environmental studies, protection and enhancements.

### **1.3.12 Other Development**

This cost element includes all costs associated with development of the AIS which have not been captured in the above cost elements.

## **1.4 System Procurement**

This cost element includes the costs for acquisition of all the elements (hardware, software, equipment, facilities and initial support) required to attain system FOC.

### **1.4.1 Deployment Hardware**

This cost element includes all of the costs associated with deployment hardware. Hardware costs include vendor contracts, GFE, other Government contracts, and any organic effort used to acquire or purchase program hardware. Include costs for first destination transportation, warranties, and user's manuals. Include the depreciated value for government owned equipment that will be utilized by the system regardless of when it was purchased and the reason for which it was purchased. Include the lease for the entire life cycle or until terminated or the equipment is purchased. Although compliance with the hardware categories listed below is preferred, it is not conducive for systems which are acquired by specific configuration, i.e., specific configuration by site size or site functionality. In this case the acquisition community normally procures the hardware by configuration and the specific hardware cost categories listed below are not available. If this is the case, develop the hardware estimate based on configurations, however, attempt to maintain as much detail as possible

for specific hardware components. The cost to the government to provide out-source, central or mega center are excluded from this element and should be included in cost element 1.5, “Outsource/Central/Mega Center Investment”.

#### **1.4.1.1 Processing Units**

This cost element aggregates the cost for various type of processing units and reflects the costs to lease, purchase or produce, or otherwise acquire system processing units regardless of source or funding.

##### **1.4.1.1.1 Central Processing Units**

This cost element includes all costs associated with the production and/or purchase or lease of the central processing units. Includes mainframes and associated hardware.

##### **1.4.1.1.2 Intermediate Processing Units**

All costs associated with the production and/or purchase or lease of the intermediate processing units. Includes mini computers and associated hardware.

##### **1.4.1.1.3 Terminal Processing Units (PCs)**

All costs associated with the production and/or purchase or lease of the terminal processing unit. Includes micro computer, PCs, laptops, workstations, terminals, etc., and associated hardware.

#### **1.4.1.2 Peripheral Devices**

All costs associated with the production and/or purchase or lease of peripheral devices used by the system. Peripheral devices shared by other systems will be prorated.

##### **1.4.1.2.1 Printers**

This cost element includes all costs associated with the production and/or purchase or lease of printers. List laser printers, high speed printers and common impact printers separately.

##### **1.4.1.2.2 Storage Devices**

This cost element includes all costs associated with the production and/or purchase or lease of storage devices. List disk drivers and optical storage separately only when they are not a functioning part of the mainframe.

##### **1.4.1.2.3 Other Peripherals**

This cost element includes all costs associated with the production and/or purchase or lease of other peripheral devices not accounted for in the categories above.

#### **1.4.1.3 Communications Hardware**

This cost element includes all costs for the hardware to establish the connectivity required by the specific system.

##### **1.4.1.3.1 Wide Area Gateways**

This cost element includes all costs associated with the production, purchase, installation and/or lease of wide-area gateways (broad band) necessary to establish the connectivity required by the automated information system.

#### **1.4.1.3.2 Wide Area Networks**

This cost element includes all costs associated with the production, purchase, installation and/or lease of wide-area networks necessary to establish the connectivity required by the automated information systems.

#### **1.4.1.3.3 Modems**

This cost element includes all costs associated with the production, purchase and/or lease of modems necessary to establish the connectivity required by the automated information systems.

#### **1.4.1.3.4 Local Area Networks**

This cost element includes all costs associated with the production, purchase, installation and/or lease of local area networks necessary to establish the connectivity required by the automated information system. If the LAN is part of a geographic communications upgrade, establish a pro-rata share.

#### **1.4.1.3.5 Crypto**

This cost element includes all costs associated with the production, purchase, installation and/or lease of crypto devices necessary to establish the security in connectivity required by the automated information system.

#### **1.4.1.3.6 Communications Circuits**

This cost element includes all costs associated with the production, installation purchase, and/or lease of other communication circuits necessary to establish the connectivity required by the AIS.

#### **1.4.1.3.7 Other Communication Hardware**

This cost element includes all costs associated with the production and/or purchase or lease of other communication hardware.

#### **1.4.1.4 Other Hardware**

This cost element includes all other hardware cost not previously detailed, such as satellite down links, radios, external power sources, dedicated trailers/vans, vehicles and mobile structures. Specify each hardware item in sub-elements of this cost element. Also, include any lease of hardware in lieu of investment.

### **1.4.2 System Deployment Software**

This cost element includes all the cost to acquire software required to support full system deployment. This is normally software which is available in the commercial market. In a multi-tiered environment (Macro, Mini, Micro) each tier should be shown separately.

Note: Application/Functional software development/procurement costs are included under cost element 1.3.3.2. The cost to develop or further modify non-developmental software is included under cost element 1.3.3.1.

#### **1.4.2.1 Operating System Software**

This cost element includes cost of the basic operating system software.

#### **1.4.2.2 General Administrative Software**

This cost element includes cost for commercial application software, such as, spreadsheets, word processing, various statistical and mathematical packages, and general data base management packages needed to perform general tasks and improve the productivity of the users.

#### **1.4.2.3 Tools Software**

This element describes leases and/or purchases of CASE tools and compilers prescribed for the environment under which the application software will run.

#### **1.4.2.4 Communication Software**

This cost element includes all costs for the software to establish the connectivity required by the specific system.

#### **1.4.3 Initial Documentation Requirements**

This cost element includes all costs incurred in preparation, revision, and reproduction of drawings, test plans, testing procedures, manuals, and other documentation for the operation of the system. Includes the cost of contracts, to collect, analyze, and distribute data required to procure, operate and support the developed system.

#### **1.4.4 Logistics Support Equipment**

This element includes those costs incurred for the equipment required in support of this program or portions of this program, while not directly engaged in the performance of its mission. Includes GFE which may, or may not, be peculiar to the program but which is not considered a part of the total system.

#### **1.4.5 Initial Spares**

This cost element includes components, assemblies, and subassemblies required for initial stockage and related wholesale pipeline in support of the information management system being implemented, from the first to the last end item implemented. This element should contain all the costs incurred in the supplying of reserve spares, and repair parts to stock the initial pipeline in both peacetime and wartime. These costs include transportation and storage of these supplies and spares.

#### **1.4.6 Warranties**

This cost element includes costs for warranties and special warranties on both hardware and software (identified separately) purchased for this system. If these warranties are included in the hardware and/or software purchase price, so state in those respective elements.

### **1.5 Outsource/Central/Mega Center Investment**

This element includes all investment, or lease in lieu of investment, required by any outsource support provider as required for the system to attain and maintain FOC.

#### **1.5.1 Capital Investment**

##### **1.5.1.1 Hardware**

This cost element includes all of the costs associated with deployment hardware. Hardware costs include vendor contracts, GFE, other Government contracts, and any organic effort used to

acquire or purchase program hardware. Include costs for first destination transportation, warranties, and user's manuals. Include the depreciated value for government owned equipment that will be utilized by the system regardless of when it was purchased and the reason for which it was purchased. Equipment/Systems which are designed to support multiple users will be prorated and the costs will be factored out of the surcharge reflected in CES 2.3.3 and 3.3.4.

#### **1.5.1.2 Software (COTS)**

This cost element includes all the cost to acquire software required to support the alternative system deployment. This is normally software which is available in the commercial market.

#### **1.5.1.3 Leasing**

##### **1.5.1.3.1 Hardware**

Include the lease for the entire life cycle or until terminated or the equipment is purchased.

##### **1.5.1.3.2 Software**

This cost element includes the cost to lease software required to support the alternative system deployment. This is normally software which is available in the commercial market.

#### **1.5.2 Central/Mega Center Software Development**

This cost element describes all costs required to develop deliverable line of application software. This might include the lease, purchase, or modification of products which assist in the planning, designing, testing, de-bugging, validating, and documenting the application software necessary to automate a specific function or operation and integrate that function into the overall AIS. When converting an AIS from an old system to a new system or adding an AIS to the systems supported by the Center, software development costs should reflect the amount of code to be transferred without modification, transferred with minor modification, bridged, redesigned, and eliminated. For contractor developed software include all program management, G&A, and other contractor related costs. For organic software development, fully burdened labor rates should be used and placed in the appropriate labor category.

##### **1.5.2.1 Military**

##### **1.5.2.2 Civilian**

##### **1.5.2.3 Contractor**

#### **1.5.3 System User Investment**

This element includes costs incurred for system user to interface with governmental or commercial regional data centers. Costs in 1.4.1 support AIS operations that did not involve regional data centers, such as Defense MegaCenters or their commercial equivalents.

#### **1.6 System Initiation, Implementation and Fielding**

This cost element aggregates the costs incurred in initiating the system for use by the functional user. It includes all costs required to transition the system to users, including training, testing, purchasing supplies, etc. Most elements contain personnel; include in other, the cost of supplies, etc.

##### **1.6.1 Initial Training**

This cost element includes all costs incurred in applying the appropriate training services, devices, accessories, aids, and equipment used to facilitate instruction through which the initial cadre of personnel will acquire sufficient concepts, skills, and aptitudes to operate and maintain the information management system.

**1.6.1.1 Military**

**1.6.1.2 Civilian**

**1.6.1.3 Contractor**

**1.6.1.4 Other**

**1.6.2 System Integration Site Test/Acceptance**

This cost element includes all costs for system related production test activities which are identifiable with the integration and evaluation of the system. Included is the cost of test equipment, hardware, and/or software to obtain or validate data. Also included is the cost of planning, execution, support, data reduction, and reports from such testing and test items consumed in the conduct of such operations, and any contract costs, as well as the cost of design and production of models, specimens, fixtures, and instrumentation in support of the test program. The element also includes the costs of system operational test activities to ensure proper system installation and operation and the cost of all efforts associated with the design and production of models, fixtures, and the instrumentation in support of the test program.

**1.6.2.1 Military**

**1.6.2.2 Civilian**

**1.6.2.3 Contractor**

**1.6.2.4 Other**

**1.6.3 Common Support Equipment**

This element refers to those items required to support and maintain the system or portions of the system while not directly engaged in the performance of its mission, and which are presently in the DoD inventory for support of other systems. This element includes all efforts required to assure the availability of this equipment for support of the particular defense materiel item. It also includes the acquisition of additional quantities of this equipment if caused by the introduction of the defense materiel item into operational service.

**1.6.4 Site Activation and Facilities Preparation**

This element contains all costs incurred in the site survey, preparation, construction and activation of a site for the acceptance and operation of the system. This element includes all costs of construction and modification of facilities which are required for the successful fielding of the system and meets the following test: The information system cannot be fielded without the construction and the need for these facilities will terminate if the system to be fielded is canceled.

**1.6.4.1 Military**

**1.6.4.2 Civilian**

**1.6.4.3 Contractor**

**1.6.4.4 Other**

**1.6.5 Initial Supplies**

This cost element includes all costs for initial stocking of consumable supplies of the operation of the information management system, i.e. computer paper, disks, tapes, forms, ribbons, etc.

### **1.6.6 Engineering Changes**

This cost element includes costs incurred in making engineering changes to the system hardware/software throughout the system life. Does not include hardware/software upgrades.

#### **1.6.6.1 Military**

#### **1.6.6.2 Civilian**

#### **1.6.6.3 Contractor**

#### **1.6.6.4 Other**

### **1.6.7 Initial Logistics Support**

Includes the cost elements identified in 2.0 from IOC at each site until FOC at all sites. At FOC at all sites, the costs reflected in these cost elements will be shown under CES 2.0. These elements do not apply to the Status Quo alternative.

#### **1.6.7.1 Annual Operations Investment**

See CES 2.2

#### **1.6.7.2 Hardware Maintenance**

See CES 2.3

#### **1.6.7.3 Software Maintenance**

See CES 2.4

#### **1.6.7.4 Mega Center Ops & Maintenance Support**

See CES 2.5

#### **1.6.7.5 Data Management**

See CES 2.6

#### **1.6.7.6 Unit Site Operations**

See CES 2.7

### **1.6.8 Office Furniture and General Support Furniture**

Includes costs for office and general support furniture required to support the AIS if it is intended for the sole use of the AIS. Office furniture to support management functions is included in CES 1.1.4.

### **1.6.9 Data Upload & Transition**

Includes site/function specific initial loading and checkout of data for the system if accomplished separately from software installation and test. Also include any expense associated with the transition of data from the current system. Accumulate costs in the appropriate categories below.

#### **1.6.9.1 Military**

#### **1.6.9.2 Civilian**

#### **1.6.9.3 Contractor**

### **1.6.10 Base/Installation Communications**

Includes all costs, not already included in cost element 1.6.4, associated with installation communications required for the AIS to meet its operational requirements. Note: Reference cost element 1.4.1.3, do not double count costs.

**1.6.10.1 Military**

**1.6.10.2 Civilian**

**1.6.10.3 Contractor**

**1.6.10.4 Other**

**1.6.11 Other**

This cost element covers any System Initiation, Implementation and Fielding cost not included in the elements above, including second destination transportation.

**1.7 Upgrade/Preplanned Product Improvement**

This cost element includes the cost of enhancements to the alternative throughout the life cycle. Normally, equipment wear and technological obsolescence results in turnover of equipment every five to ten years. In many cases when hardware changes are made, software is also upgraded to take maximum advantage of the increased hardware capability.

**1.7.1 Upgrade Development**

This cost element includes the development of all pre-planned product improvement costs throughout the alternative system life for hardware and software. It includes software development to accommodate the changing technology in hardware. This is in addition to the annual software maintenance costs reflected in CES 2.4.

**1.7.1.1 Hardware**

**1.7.1.2 Software**

**1.7.1.2.1 Military**

**1.7.1.2.2 Civilian**

**1.7.1.2.3 Contractor**

**1.7.2 Life Cycle Upgrades Procurement**

This cost element includes all product improvement upgrade costs throughout the system life cycle. Specifics of hardware and software upgrades should be well documented.

**1.7.2.1 Hardware Upgrades**

**1.7.2.2 Software Upgrades**

This cost element includes all the cost to acquire software required to accommodate the hardware upgrade. This is normally software which is available in the commercial market.

**1.7.2.3 Other**

**1.7.3 Central Mega Center Upgrades**

This cost element includes those expenditures identified in 1.7.1 and 1.7.2 when they are incurred by the MegaCenters in support of the system.

## **1.8 Disposal / Reuse**

### **1.8.1 Capital Recoupment**

This cost element captures the value of any assets turned in to a repository for redistribution or any assets which may have recyclable value.

### **1.8.2 Retirement**

This cost element captures the cost of the effort required to dispose of equipment and may include charges for destroying the equipment.

### **1.8.3 Environmental/Hazardous Disposal**

This cost element captures the cost of the effort required to dispose of environmental hazardous equipment and may include charges for destroying the equipment

## **2.0 SYSTEM OPERATIONS AND SUPPORT**

This major element includes all costs to sustain the AIS alternative after FOC at all sites. It includes the cost to manage and maintain the hardware and software, whether centrally or at each unit, to sustain operations throughout the life cycle, and to provide the basis for the benefits identified in the FEA. This major cost element will be used to show all costs associated with the operations of the Status Quo alternative. When providing the cost estimate for the Status Quo alternative, this element will be used to identify the costs from program inception through FOC plus ten years.

### **2.1 System/Material/Item Management**

This cost element covers the resource requirements for system management. Management includes the costs incurred in the process of acquiring, employing, and retraining needed personnel. I.E. fully burdened salaries, benefits, relocation expenses, retirement actuarial, required TDY, and all costs associated with the personnel of the deployed AIS. It also includes the services, studies and support resources needed to manage the program after deployment.

#### **2.1.1 Personnel**

This cost element contains all labor cost associated with O&S costs for configuration, material, and systems management associated with the distribution, warehousing, cataloging, technical support, personnel, and facilities for system specific activities. It includes the program management function after FOC, and the centralized control, management, and design of the AIS throughout its life cycle. It also includes the centralized system administrators and system operators. The personnel necessary to operate the AIS system at each unit location are included in cost element 2.7.1. Accumulate costs in the appropriate categories below.

##### **2.1.1.1 Military**

##### **2.1.1.2 Civilian**

##### **2.1.1.3 Contractor**

##### **2.1.1.4 Other**

#### **2.1.2 TDY**

This cost element includes the travel costs of persons in the system/material /item management function as they conduct program related trips.

### **2.1.3 Other Government Support**

This cost element covers any indirect government support costs related to system/material/item management not covered in the categories above.

#### **2.1.3.1 Military**

#### **2.1.3.2 Civilian**

#### **2.1.3.3 Other**

### **2.1.4 Other**

This cost element covers any system/material/item management costs not covered in the categories above and may include such things as facilities, leasing, studies, contract management support, supplies, etc.

## **2.2 Annual Operations Investment**

This element contains all costs associated with the acquisition and first destination transportation of replacement components, replenishment spares, supplies and consumables required over the life cycle of the specific system. Included are costs incurred in the acquisition of replacement parts, supplies and consumables to re-supply the initial pipeline. The replacement of major system components that cost in excess of \$ 25K each must be included under cost element 1.0, "Investment". Accumulate costs in the appropriate categories below.

### **2.2.1 Annual Systems Maintenance Investment**

### **2.2.2 Replenishment Spares**

### **2.2.3 Replenishment Supplies and Consumables**

## **2.3 Hardware Maintenance**

This cost element includes cost incurred in providing maintenance and repair for the system hardware regardless of who has "ownership" of the equipment or responsibility for repair. These costs include, but are not limited to: overhaul expenses, programmed maintenance expense (periodic inspection of war reserve material), component repair, minor facilities modifications and upkeep, support equipment repair (test equipment, trucks, generators, etc.), lab calibration, depot support data, second destination transportation, and administrative support required for maintenance operations. All equipment's covered in CES 1.4.1 and 1.5.1 should be included. Note: When maintenance support is not accomplished by a local facility, organic or contract, such as overseas, remote locations, mobile operations, and due to contract considerations, cost for additional components and spares that must be provided at the deployed locations are included in CES 1.4.5.

### **2.3.1 Organic Hardware Maintenance**

This cost element captures the fully burdened labor costs associated with government hardware maintenance for the fielded system. Accumulate the costs in the appropriate categories below.

#### **2.3.1.1 Military**

#### **2.3.1.2 Civilian**

### **2.3.2 Contract Maintenance Support**

This cost element aggregates all costs for maintenance performed by contract or covered by an Interservice Support Agreement (ISSA). When a single contract is used to cover a combination of

devices, the G&A, fee, contract administration costs, etc. will be listed in this CE with the actual maintenance costs listed in the following CEs (when separately priced).

#### **2.3.2.1 Processing Units**

This cost element covers the maintenance for CES 1.4.1.1. Provide details in the documentation.

#### **2.3.2.2 Peripheral Devices**

This cost element covers the maintenance for CES 1.4.1.2. Provide details in the documentation.

#### **2.3.2.3 Communications Hardware**

This cost element covers the maintenance for CES 1.4.1.3. Provide details in the documentation.

#### **2.3.2.4 Other Hardware**

This cost element describes all other contractor hardware maintenance costs which have not been captured in the hardware maintenance categories above. List each sub-element under this cost element and describe fully.

#### **2.3.3 Other**

This cost element includes all hardware maintenance costs which are incurred by a centralized support facility.

#### **2.3.3.1 Outsource /Mega Center Support**

#### **2.3.3.2 Other Government Agency Support**

### **2.4 Software Maintenance**

This element includes all costs for software maintenance for the new system. When identifying software and data maintenance costs in these categories include vendor contracts, GFE, other Government contracts, facilities upkeep, and ISSAs. It does not include system management activities such as system redesign or programmers/operators which are covered under CES 2.1. All software maintenance costs including related local contract services for research and studies that contribute to software and data maintenance planning, and development must be included.

#### **2.4.1 Commercial-off -the Shelf (COTS)**

This cost element aggregates the software maintenance costs for the four different software types listed below.

##### **2.4.1.1 Operating System Software**

This cost element reflects licensing and update costs of the operating system software. See CES 1.4.2.1.

##### **2.4.1.2 General Administrative Software**

This cost element reflects maintenance of software identified in CES 1.4.2.2 and that software which was transferred from the old system to the new system without development.

#### **2.4.1.3 Tools**

This cost element reflects maintenance of software identified in CES 1.4.2.3.

#### **2.4.1.4 Communications Software**

This cost element reflects maintenance of software identified in CES 1.4.2.4.

### **2.4.2 Application/Mission Software (Non-COTS)**

This cost element describes the maintenance of software identified in CES 1.3.3.2. Accumulate the costs in the appropriate categories below.

#### **2.4.2.1 Military**

#### **2.4.2.2 Civilian**

#### **2.4.2.3 Contractor**

### **2.4.3 Communications Software (Non-COTS)**

This cost element describes the maintenance of the Communications Software developed in CES 1.3.3.3.

#### **2.4.3.1 Military**

#### **2.4.3.2 Civilian**

#### **2.4.3.3 Contractor**

### **2.4.4 Data Center Software**

This cost element describes the maintenance of the Data Center Software developed in CES 1.5.2.

#### **2.4.4.1 Military**

#### **2.4.4.2 Civilian**

#### **2.4.4.3 Contractor**

### **2.4.5 Other Software Maintenance**

This cost element includes all other software maintenance costs not captured in the categories above. List each sub-element and fully describe.

#### **2.4.5.1 Military**

#### **2.4.5.2 Civilian**

#### **2.4.5.3 Contractor**

## **2.5 Mega-centers Operating Support**

This cost element contains the costs associated with services received by the AIS from a Mega-center in support of the Systems operations. When investment and operating support costs are included in an annual surcharge or fee, this fee will be separated into the various components which generated that fee and added to the appropriate elements of this CES.

## **2.6 Data Maintenance**

This cost element reflects the maintenance costs to keep the new system data current. It includes labor expense to accomplish data maintenance as well as specific supplies consumed during the maintenance of the data in the two categories listed below.

### **2.6.1 Mission Application Data**

This cost element reflects the maintenance cost for mission specific data developed in CES 1.3.5.

#### **2.6.1.1 Military**

#### **2.6.1.2 Civilian**

#### **2.6.1.3 Contractor**

#### **2.6.1.4 Other**

### **2.6.2 Standard Administrative Data**

This cost element reflects the maintenance cost for standard administrative data developed in CES 1.3.5.

#### **2.6.2.1 Military**

#### **2.6.2.2 Civilian**

#### **2.6.2.3 Contractor**

## **2.7 Unit/Site Operations**

This cost element includes personnel costs, as well as, fuel and power requirements, training, communications, facilities maintenance, etc.

### **2.7.1 System Operation Personnel**

This element includes the decentralized system administrators and system operators. It includes the personnel necessary to operate the hardware/software. It does not include functional personnel which interface with the system. Accumulate costs in the appropriate categories below.

#### **2.7.1.1 Military**

#### **2.7.1.2 Civilian**

#### **2.7.1.3 Contractor**

### **2.7.2 Utility Requirements**

This cost element includes the costs of commercial utilities (power, water, etc.) required for the operation and cooling of the system hardware including all peripheral devices.

### **2.7.3 Fuel and POL**

This element includes the costs for fuel, oil, and lubricants to operate the system and support equipment. Examples are fuels for generators and vehicles and coolants for environmental central systems.

### **2.7.4 Facilities Lease and Maintenance**

This element contains all costs associated with facilities operations which can be directly attributed to the system being fielded or in support of its personnel. These costs include, but are not limited to: facilities, power requirements, special material and supplies, leased or owned facilities and construction, operations, maintenance of facilities.

### **2.7.5 Communications**

This cost element aggregates the cost of leasing and maintenance for the system communication costs.

#### **2.7.5.1 Long Haul**

This cost element includes costs for all required communications from the local (base) level through the DoD level, such as leased long lines, long distance networks for data and voice, and other costs to interconnect components of the AIS and interface with other systems (including input and output).

#### **2.7.5.2 Intra-Base**

The cost of leasing or maintenance of local area networks and intra base communications. When communications are shared, costs will be prorated, and the proration methodology will be reflected in the documentation.

#### **2.7.6 Base Operating Support**

The allocated cost of providing personnel support to the system's dedicated personnel. This includes medical, personnel, MWR, financial and subsistence support to people. It is normally based on the population of system personnel being supported.

#### **2.7.7 Recurring Training**

This element contains all costs associated with training services, devices, accessories, aids, equipment, facilities, and parts used to facilitate instruction through which personnel will acquire sufficient concepts, skill, and aptitudes to operate and maintain the information management system. This element includes the effort associated with the maintenance of training equipment, as well as the execution of training services. It includes the basic, burdened wage of the trainers, but not the wage of the trainees covered in CES 2.7.1. It also includes TDY of Government personnel for training, and the cost of any contracts to train personnel. Costs will be accumulated in the appropriate categories.

##### **2.7.7.1 Military**

##### **2.7.7.2 Civilian**

##### **2.7.7.3 Contractor**

##### **2.7.7.4 Other**

#### **2.7.8 Miscellaneous Support**

This cost element describes all other resources necessary to support the AIS in the local areas. Accumulate the costs in the appropriate categories below. Include second destination transportation in the other category.

##### **2.7.8.1 Military**

##### **2.7.8.2 Civilian**

##### **2.7.8.3 Contractor**

##### **2.7.8.4 Other**

### **2.8 Environmental and Hazardous Material Storage and Handling**

This cost element includes all support and maintenance costs associated with environmental studies, protection, and enhancements, including costs associated with the handling and storage of environmental and hazardous materials associated with the specific AIS.

### **2.9 Contract Leasing**

This cost element includes all costs associated with leasing, maintenance and support of hardware ADP equipment for the life cycle of the system when not covered under Cell 1.4. Use the same sub-

elements as contained in Cell 1.4 in supplemental documentation. All outsource leasing or lease in lieu of investment are covered under cost element 1.0, "Investment".

### **3.0 ALTERNATIVE PHASE OUT (STATUS QUO) PROFILE**

This cost element includes the costs incurred in managing, supporting and maintaining the day-to-day operations of the status quo system as it runs parallel to the phasing in of the new system. Personnel costs are reflected, as well as any projected hardware replacements and all maintenance for hardware and software. It begins prior to IOC and continues until after FOC of the last unit. When providing an estimate of the Status Quo alternative this major element will not be used except for Sunk Costs.

#### **3.1 System Management**

This cost element includes the costs of managing the status quo system.

##### **3.1.1 Personnel**

This cost element includes the fully burdened labor costs for the business and administrative planning, organizing, directing, coordinating, controlling, and approval actions designated to accomplish overall program objectives associated with the status quo system until it is finally phased out. Accumulate costs in the appropriate categories below.

###### **3.1.1.1 Military**

###### **3.1.1.2 Civilian**

###### **3.1.1.3 Contractor**

##### **3.1.2 TDY**

This cost element includes the travel costs (i.e., transportation, per diem, etc.) of persons in the system management function as they conduct program related trips.

##### **3.1.3 Other Government Support**

This cost element covers any indirect government support related to system management in the status quo phase out period.

###### **3.1.3.1 Military**

###### **3.1.3.2 Civilian**

###### **3.1.3.3 Other**

##### **3.1.4 Other**

This element covers any system management cost not covered in the other categories above and may include such things as supplies, equipment, facilities, leasing, studies, contract management support, etc.

#### **3.2 Phase Out Investment**

This cost element reflects the costs of replacing any hardware which is inoperable and is not capable of supporting the mission in the status quo system only as it transitions to the new system. Document the specific hardware replacements.

##### **3.2.1 Deployment Hardware**

This cost element describes all of the elements associated with replacement hardware. When identifying hardware costs, look into your program's vendor contracts, GFE, other Government contracts, and any organic effort used to procure the Status Quo hardware. Includes costs for first destination transportation, warranties, and user's manuals, if applicable

#### **3.2.1.1 Processing Units**

This cost element aggregates the cost for various type of processing units and reflects the costs to lease, purchase or produce, consistent with the definition in 1.4.1.1.

##### **3.2.1.1.1 Central Processing Units**

This cost element includes all costs associated with the production and/or purchase or lease of the central processing units. Includes mainframes and associated hardware.

##### **3.2.1.1.2 Intermediate Processing Units**

All costs associated with the production and/or purchase or lease of the intermediate processing units. Includes mini computers and associated hardware.

##### **3.2.1.1.3 Terminal Processing Units (PCs)**

All costs associated with the production and/or purchase or lease of the terminal processing unit. Includes micro computer, PCs, laptops, workstations, terminals, etc., and associated hardware.

#### **3.2.1.2 Peripheral Devices**

##### **3.2.1.2.1 Printers**

This cost element includes all costs associated with the production and/or purchase or lease of printers. List laser printers, high speed printers and common impact printers separately.

##### **3.2.1.2.2 Storage Devices**

This cost element includes all costs associated with the production and/or purchase or lease of storage devices. List disk drivers and optical storage separately only when they are not a functioning part of the mainframe.

##### **3.2.1.2.3 Other Peripherals**

This cost element includes all costs associated with the production and/or purchase or lease of other peripheral devices not accounted for in the categories above.

#### **3.2.1.3 Communications Hardware**

This cost element includes all costs for the hardware to establish the connectivity required by the specific system.

##### **3.2.1.3.1 Wide Area Gateways**

This cost element includes all costs associated with the production, purchase, installation and/or lease of wide-area gateways (broad band) necessary to establish the connectivity required by the automated information system.

##### **3.2.1.3.2 Wide Area Networks**

This cost element includes all costs associated with the production, purchase, installation and/or lease of wide-area networks necessary to establish the connectivity required by the automated information systems.

#### **3.2.1.3.3 Modems**

This cost element includes all costs associated with the production, purchase and/or lease of modems necessary to establish the connectivity required by the automated information systems.

#### **3.2.1.3.4 Local Area Networks**

This cost element includes all costs associated with the production, purchase, installation and/or lease of local area networks necessary to establish the connectivity required by the automated information system. If the LAN is part of a geographic communications upgrade, establish a pro-rata share.

#### **3.2.1.3.5 Crypto**

This cost element includes all costs associated with the production, purchase, installation and/or lease of crypto devices necessary to establish the security in connectivity required by the automated information system.

#### **3.2.1.3.6 Communications Circuits**

This cost element includes all costs associated with the production, installation purchase, and/or lease of other communication circuits necessary to establish the connectivity required by the AIS.

#### **3.2.1.3.7 Other Communication Software**

This cost element includes all costs associated with the production and/or purchase or lease of other communication software.

#### **3.2.1.4 Other Hardware**

This cost element includes all other hardware cost not detailed, such as vehicles and mobile structures. Specify each hardware item in sub-elements of this cost element.

### **3.2.2 Software (non-developmental )**

This cost element includes all software which is available in the commercial market and which requires little or no modification to utilize. In a multi-tiered environment (Macro, Mini, Micro) each tier should be shown separately.

#### **3.2.2.1 Operating System Software**

This cost element includes cost of the basic operating system software if replacement is needed prior to the phase out of the Status Quo.

#### **3.2.2.2 Application (Mission) Software**

This cost element includes cost of the application software if replacement is needed prior to the phase out of the Status Quo.

#### **3.2.2.3 Interface Software**

This cost element includes cost of the software needed to maintain inter-connectivity with the users if replacement is needed prior to phase out of the Status Quo.

#### **3.2.2.4 Communication Software**

This cost element includes all costs for the software to establish the connectivity required by the specific system.

#### **3.2.3 Environmental and Hazardous Material Storage and Handling**

This cost element includes all costs associated with environmental studies, protection, and enhancements, including costs associated with the handling and storage of environmental and hazardous materials of the Status Quo.

### **3.3 Status Quo Phase Out Operations & Support**

#### **3.3.1 Hardware Maintenance**

This cost element includes cost incurred in providing maintenance and repair for the system hardware for the status quo regardless of who has "ownership" of the equipment or responsibility for repair. These costs include, but are not limited to: overhaul expenses, programmed maintenance expense (periodic inspection of war reserve material), component repair, minor facilities modifications and upkeep, support equipment repair (test equipment, trucks, generators, etc.), lab calibration, depot support data, second destination transportation, and administrative support required for maintenance operations

##### **3.3.1.1 Military**

##### **3.3.1.2 Civilian**

##### **3.3.1.3 Contractor**

##### **3.3.1.4 Other**

#### **3.3.2 Software Maintenance**

This cost element reflects the costs incurred in providing maintenance and repair for the system software for the status quo only, regardless of who has ownership of the software or responsibility for repair. When identifying software and data maintenance costs in these categories include vendor contracts, GFE, other Government contracts, facilities upkeep, and ISSAs. All software maintenance costs including related local contract services for research and studies that contribute to software and data maintenance planning, development and maintenance must be included.

##### **3.3.2.1 Military**

##### **3.3.2.2 Civilian**

##### **3.3.2.3 Contractor**

#### **3.3.3 Unit/Site Operations**

This cost element includes all costs associated with support facilitates operations which can be directly attributed to the status quo system during phase out, or in support of its personnel.. These costs include but are not limited to: power requirements, special material and supplies, facilities and construction, operations, maintenance of facilities, administrative personnel, medical, contract service/support, equipment leasing, retraining, base operations data, base communications, base transportation, installation support and miscellaneous support functions.

### **3.3.3.1 System Operation Personnel**

This cost element describes the fully burdened labor costs for status quo system operators, with costs accumulated in the categories below.

#### **3.3.3.1.1 Military**

#### **3.3.3.1.2 Civilian**

#### **3.3.3.1.3 Contractor**

### **3.3.3.2 Utility Requirements**

This cost element describes the costs of commercial utilities required for the operation and cooling of the status quo system hardware, including all peripheral devices. If the new system is partially fielded, an apportionment of power requirements can be accomplished for each system. Provide apportionment rationale in the documentation.

### **3.3.3.3 Fuel and POL**

This element includes the costs for fuel, oil, and lubricants to operate the system and support equipment. Examples are fuels for generators and vehicles and coolants for environmental systems.

### **3.3.3.4 Facilities Maintenance**

This element contains all costs of real property upkeep or rental fee paid for occupancy of facilities for the status quo system. It does not include facilities occupied by users in a distributed system unless the space is dedicated to the system operations. Included are minor construction and maintenance of real property and upgrade of facilities necessary to sustain the system during the phase out period.

### **3.3.3.5 Communications**

This cost element aggregates the cost of leasing and maintenance for status quo communication costs.

#### **3.3.3.5.1 Long Haul**

This cost element captures the costs of DDN monthly charges, leased long lines, communications usage fees, and other charges generated to interconnect components of the status quo system with other systems. This includes all required communications from the local level through the DoD level.

#### **3.3.3.5.2 Intra Base**

This cost element includes the cost of leasing or maintenance of local area networks and intra-base communications in support of the status quo system. When communications are shared, cost will be prorated, and the proration methodology described in the documentation.

### **3.3.3.6 Base Operating Support**

This cost element reflects the cost of providing personnel support to the status quo's dedicated personnel. This includes medical, personnel, MWR, financial and subsistence support to people. It is normally based on the population of system personnel being supported.

### **3.3.3.7 Annual Operations Investment**

This element contains all costs associated with the acquisition and first destination transportation of replacement components, replenishment spares, supplies and consumables required to support the Status Quo prior to its phase out. Included are costs incurred in the acquisition of replacement parts, supplies and consumables to re-supply the initial pipeline.

- 3.3.3.7.1 Annual Systems Maintenance Investment**
- 3.3.3.7.2 Replenishment Spares**
- 3.3.3.7.3 Replenishment Supplies and Consumables**

#### **3.3.3.8 Recurring Training**

This cost element contains all costs associated with training services, devices, accessories, aids, equipment, facilities, and parts used to facilitate instruction through which personnel will sustain sufficient concepts, skill, and aptitudes to operate and maintain the information management system. This element includes the effort associated with the maintenance of training equipment, as well as the execution of training services. It also includes TDY of Government personnel for training, and the cost of any contracts to train personnel. Accumulate the costs in the appropriate categories below.

- 3.3.3.8.1 Military**
- 3.3.3.8.2 Civilian**
- 3.3.3.8.3 Contractor**
- 3.3.3.8.4 TDY**

#### **3.3.3.9 Miscellaneous Support**

This cost element describes all other resources necessary to support the status quo system in the local areas, including second destination transportation. Costs will be accumulated in the appropriate categories below.

- 3.3.3.9.1 Military**
- 3.3.3.9.2 Civilian**
- 3.3.3.9.3 Contractor**
- 3.3.3.9.4 Other**

#### **3.3.4 Mega-centers Operating Support**

This cost element contains all costs associated with services received by the Status Quo AIS from a Mega-center in support of the systems operations in the Status Quo.

#### **3.3.5 Phase Out Contracts**

This cost element includes all costs associated with leasing hardware ADP equipment and contract termination for the status quo.

- 3.3.5.1 Leasing**
- 3.3.5.2 Termination**

# **GENERIC COST ELEMENT STRUCTURE**

## **MAJOR COST ELEMENTS**

**1.0 INVESTMENT**

**2.0 SYSTEM OPS & SPT**

**3.0 ALT PHASE OUT  
(SQ PROFILE)**

Figure B-1

## **GENERIC COST ELEMENT STRUCTURE**

### **2ND level of Indenture**

- 1.0 INVESTMENT**
  - 1.1 Program Management**
  - 1.2 Concept Exploration**
  - 1.3 System Development**
  - 1.4 System Procurement**
  - 1.5 Outsource/Central/ Mega Center Investment**
  - 1.6 System Initiation, Implementation & Fielding**
  - 1.7 Upgrade/P3I**
  - 1.8 Disposal/Reuse**
- 2.0 SYSTEM OPS & SPT**
  - 2.1 System/Material/Item Mgmt**
  - 2.2 Annual Operations Investment**
  - 2.3 Hardware Maintenance**
  - 2.4 Software Maintenance**
  - 2.5 Mega Center Ops & Maint Spt**
  - 2.6 Data Maintenance**
  - 2.7 Unit/Site Operations**
  - 2.8 Env & Haz Mat Store & Hand**
  - 2.9 Contract Leasing**
- 3.0 ALT PHASE OUT**
  - (SQ PROFILE)**
  - 3.1 System Management**
  - 3.2. Phase Out Investment**
  - 3.3 SQ Phase Out Ops & Spt**

**Figure B-2**

## GENERIC COST ELEMENT STRUCTURE

### 3RD level of Indenture

#### 1.0 INVESTMENT

##### 1.1 Program Management

- 1.1.1 Personnel
- 1.1.2 TDY
- 1.1.3 Other Government Support
- 1.1.4 Other

##### 1.2 Concept Exploration

- 1.2.1 Engineering Analysis & Specs
- 1.2.2 Concept Exploration Hardware
- 1.2.3 Concept Exploration Software
- 1.2.4 Concept Exploration Data
- 1.2.5 Exploration Documentation
- 1.2.6 Concept Exploration Testing
- 1.2.7 Facilities
- 1.2.8 Other (Log Spt, Env, etc., as req)

##### 1.3 System Development

- 1.3.1 System Design & Specification
- 1.3.2 Dev, Prototype & Test Site Investment
- 1.3.3 Software Development
- 1.3.4 System Documentation
- 1.3.5 Data Development & Transition
- 1.3.6 Data Base Standards/Dictionary
- 1.3.7 Training Development
- 1.3.8 Test and Evaluate
- 1.3.9 Development Logistics Support
- 1.3.10 Facilities
- 1.3.11 Environmental
- 1.3.12 Other Development

##### 1.4 System Procurement

- 1.4.1 Deployment Hardware
- 1.4.2 System Deployment Software
- 1.4.3 Initial Documentation Reqmts
- 1.4.4 Logistics Support Equipment
- 1.4.5 Initial Spares
- 1.4.6 Warranties

##### 1.5 Outsource/Central/ Mega Center Investment

- 1.5.1 Capital Investment
- 1.5.2 Software Development
- 1.5.3 System User Investment

##### 1.6 System Initiation, Implementation & Fielding

- 1.6.1 Initial Training
- 1.6.2 System Integration, Site Test/Acceptance
- 1.6.3 Common Support Equipment
- 1.6.4 Site Activation & Facilities Prep
- 1.6.5 Initial Supplies
- 1.6.6 Engineering Changes
- 1.6.7 Initial Logistics Support
- 1.6.8 Office Furn & Gen Support Furnishings
- 1.6.9 Data Upload & Transition
- 1.6.10 Base/Installation Comm
- 1.6.11 Other

##### 1.7 Upgrade/P3I

- 1.7.1 Upgrade Development
- 1.7.2 Life Cycle Upgrades Procure
- 1.7.3 Central Mega Center Upgrades

#### 1.8 Disposal/Reuse

- 1.8.1 Capital Recoupment
- 1.8.2 Retirement
- 1.8.3 Environ/Hazardous Disp

#### 2.0 SYSTEM OPS & SPT

##### 2.1 System/Material/Item Mgmt

- 2.1.1 Personnel
- 2.1.2 TDY
- 2.1.3 Other Government Support
- 2.1.4 Other

##### 2.2 Annual Operations Investment

- 2.2.1 Annual System Maint. Investment
- 2.2.2 Replenishment Spares
- 2.2.3 Replen Supplies & Consumables

##### 2.3 Hardware Maintenance

- 2.3.1 Organic Hardware Maintenance
- 2.3.2 Contract Maintenance Support
- 2.3.3 Other Hardware Maint.

##### 2.4 Software Maintenance

- 2.4.1 Comm Off-the-Shelf (COTS)
- 2.4.2 Appl/Mission (Non-COTS)
- 2.4.3 Comm Software (Non-COTS)
- 2.4.4 Data Center Software
- 2.4.5 Other Software

##### 2.5 Mega Center Ops & Maint Spt

##### 2.6 Data Maintenance

- 2.6.1 Mission Application Data
- 2.6.2 Standard Admin Data

##### 2.7 Unit/Site Operations

- 2.7.1 System Operation Personnel
- 2.7.2 Utility Requirements
- 2.7.3 Fuel & POL
- 2.7.4 Facilities Lease & Maintenance
- 2.7.5 Communications
- 2.7.6 Base Operating Support
- 2.7.7 Recurring Training
- 2.7.8 Miscellaneous Support

##### 2.8 Env & Haz Mat Store & Hand

##### 2.9 Contract Leasing

#### 3.0 ALT PHASE OUT (SQ PROFILE)

##### 3.1 System Management

- 3.1.1 Personnel
- 3.1.2 TDY
- 3.1.3 Other Government Support

##### 3.2 Phase Out Investment

- 3.2.1 Hardware
- 3.2.2 Software
- 3.2.3 Env & Haz Mat Store & Hand

##### 3.3 SQ Phase Out Ops & Spt

- 3.3.1 Hardware Maintenance
- 3.3.2 Software Maintenance
- 3.3.3 Unit/Site Operations
- 3.3.4 Mega Ctr Operating & Maint Spt
- 3.3.5 Phase Out Contracts

Figure B-3

# GENERIC COST ELEMENT STRUCTURE

## 4TH level of Indenture

<b>1.0 INVESTMENT</b>	1.3.9 Development Logistics Support	1.6.9 Data Upload & Transition
<b>1.1 Program Management</b>	1.3.9.1 Military	1.6.9.1 Military
1.1.1 Personnel	1.3.9.2 Civilian	1.6.9.2 Civilian
1.1.1.1 Military	1.3.9.3 Contractor	1.6.9.3 Contractor
1.1.1.2 Civilian	1.3.9.4 Other	1.6.10 Base/Installation Comm
1.1.1.3 Contractor	1.3.10 Facilities	1.6.10.1 Military
1.1.2 TDY	1.3.11 Environmental	1.6.10.2 Civilian
1.1.3 Other Government Support	1.3.12 Other Development	1.6.10.3 Contractor
1.1.3.1 Military	<b>1.4 System Procurement</b>	1.6.10.4 Other
1.1.3.2 Civilian	1.4.1 Deployment Hardware	<b>1.7 Upgrade/P3I</b>
1.1.3.3 Other	1.4.1.1 Processing Units	1.7.1 Upgrade Development
1.1.4 Other	1.4.1.2 Peripheral Devices	1.7.1.1 Hardware
<b>1.2 Concept Exploration</b>	1.4.1.3 Communications Hardware	1.7.1.2 Software
1.2.1 Engineering Analysis & Specs	1.4.1.4 Other Hardware	1.7.2 Life Cycle Upgrades Procure
1.2.1.1 Military	1.4.2 System Deployment Software	1.7.2.1 Hardware Upgrades
1.2.1.2 Civilian	1.4.2.1 Operating System Software	1.7.2.2 Software Upgrades
1.2.1.3 Contractor	1.4.2.2 Gen Admin Software	1.7.2.3 Other
1.2.2 Concept Exploration Hardware	1.4.2.3 Tools Software	1.7.3 Central Mega Center Upgrades
1.2.3 Concept Exploration Software	1.4.2.4 Communications Software	<b>1.8 Disposal/Reuse</b>
1.2.3.1 COTS	1.4.3 Initial Documentation Reqmts	1.8.1 Capital Recoupment
1.2.3.2 Other Software	1.4.4 Logistics Support Equipment	1.8.2 Retirement
1.2.3.3 Software Exploration	1.4.5 Initial Spares	1.8.3 Environ/Hazardous Disp
1.2.4 Concept Exploration Data	1.4.6 Warranties	<b>2.0 SYSTEM OPS &amp; SPT</b>
1.2.4.1 Data Acquisition	<b>1.5 Outsrc/Centrl/ Mega Ctr Invest</b>	<b>2.1 System/Material/Item Mgmt</b>
1.2.4.2 Data Exploration	1.5.1 Capital Investment	2.1.1 Personnel
1.2.5 Exploration Documentation	1.5.1.1 Hardware	2.1.1.1 Military
1.2.5.1 Documentation Acquisition	1.5.1.2 Software (COTS)	2.1.1.2 Civilian
1.2.5.2 Documentation Exploration	1.5.1.3 Lease (in lieu of Dir Invest)	2.1.1.3 Contractor Support
1.2.6 Concept Exploration Testing	1.5.2 Software Development	2.1.1.4 Other
1.2.6.1 Testing Acquisition	1.5.2.1 Military	2.1.2 TDY
1.2.6.2 Testing Development	1.5.2.2 Civilian	2.1.3 Other Government Support
1.2.7 Facilities	1.5.2.3 Contractor	2.1.3.1 Military
1.2.8 Other (Log Spt, Env, etc., as req)	1.5.3 System User Investment	2.1.3.2 Civilian
<b>1.3 System Development</b>	<b>1.6 Sys Init, Implement &amp; Fieldng</b>	2.1.3.3 Other
1.3.1 System Design & Specification	1.6.1 Initial Training	2.1.4 Other
1.3.1.1 Personnel	1.6.1.1 Military	<b>2.2 Annual Operations Investment</b>
1.3.1.2 Other	1.6.1.2 Civilian	2.2.1 Annual System Maint. Investment
1.3.2 Dev, Prototype & Test Site Invest	1.6.1.3 Contractor	2.2.2 Replenishment Spares
1.3.2.1 Development Hdwre Invest	1.6.1.4 Other	2.2.3 Replen Supplies & Consumables
1.3.2.2 Dev Software Investment	1.6.2 Sys Integra, Site Test/Accept	<b>2.3 Hardware Maintenance</b>
1.3.3 Software Development	1.6.2.1 Military	2.3.1 Organic Hardware Maintenance
1.3.3.1 COTS Modification	1.6.2.2 Civilian	2.3.1.1 Military
1.3.3.2 Appl/Mission (Non-COTS)	1.6.2.3 Contractor	2.3.1.2 Civilian
1.3.3.3 Comm Software Dev/Mod	1.6.2.4 Other	2.3.2 Contract Maintenance Support
1.3.4 System Documentation	1.6.3 Common Support Equipment	2.3.2.1 Processing Units
1.3.4.1 Military	1.6.4 Site Activation & Facilities Prep	2.3.2.2 Peripheral Devices
1.3.4.2 Civilian	1.6.4.1 Military	2.3.2.3 Communications Hardware
1.3.4.3 Contractor	1.6.4.2 Civilian	2.3.2.4 Other Hardware
1.3.5 Data Development & Transition	1.6.4.3 Contractor	2.3.3 Other Hardware Maint.
1.3.5.1 Military	1.6.4.4 Other	2.3.3.1 Outsource/Mega Center Spt
1.3.5.2 Civilian	1.6.5 Initial Supplies	2.3.3.2 Other Govern Agency Spt
1.3.5.3 Contractor	1.6.6 Engineering Changes	<b>2.4 Software Maintenance</b>
1.3.5.4 COTS DBMS	1.6.6.1 Military	2.4.1 Comm Off-the-Shelf (COTS)
1.3.6 Data Base Standards/Dictionary	1.6.6.2 Civilian	2.4.1.1 Operating System
1.3.6.1 Military	1.6.6.3 Contractor	2.4.1.2 General Administrative
1.3.6.2 Civilian	1.6.6.4 Other	2.4.1.3 Tools
1.3.6.3 Contractor	1.6.7 Initial Logistics Support	2.4.1.4 Communications Software
1.3.6.4 Other	1.6.7.1 Annual Ops Investment	2.4.2 Appl/Mission (Non-COTS)
1.3.7 Training Development	1.6.7.2 Hardware Maintenance	2.4.2.1 Military
1.3.7.1 Military	1.6.7.3 Software Maintenance	2.4.2.2 Civilian
1.3.7.2 Civilian	1.6.7.4 Mega Ctr Maint Support	2.4.2.3 Contractor
1.3.7.3 Contractor	1.6.7.5 Data Management	2.4.3 Comm Software (Non-COTS)
1.3.7.4 Other	1.6.7.6 Unit Site Ops	2.4.3.1 Military
1.3.8 Test and Evaluate	1.6.8 Office Furn & Gen Support Furn	2.4.3.2 Civilian
1.3.8.1 Development Test & Eval		2.4.3.3 Contractor
1.3.8.2 Independent V & V		
1.3.8.3 Ops Test & Evaluation		

Figure B-4



<b>GENERIC COST ELEMENT STRUCTURE</b>	
<b>4TH level of Indenture</b>	
2.4.4 Data Center Software	<b>3.0 ALT PHASE OUT</b>
2.4.4.1 Military	<b>(SQ PROFILE)</b>
2.4.4.2 Civilian	<b>3.1 System Management</b>
2.4.4.3 Contractor	3.1.1 Personnel
2.4.5 Other Software	3.1.1.1 Military
2.4.5.1 Military	3.1.1.2 Civilian
2.4.5.2 Civilian	3.1.1.3 Contractor Support
2.4.5.3 Contractor	3.1.2 TDY
<b>2.5 Mega Center Ops &amp; Maint Spt</b>	3.1.3 Other Government Support
<b>2.6 Data Maintenance</b>	3.1.3.1 Military
2.6.1 Mission Application Data	3.1.3.2 Civilian
2.6.1.1 Military	3.1.3.3 Other
2.6.1.2 Civilian	3.1.4 Other
2.6.1.3 Contractor	<b>3.2. Phase Out Investment</b>
2.6.1.4 Other	3.2.1 Hardware
2.6.2 Standard Admin Data	3.2.1.1 Processing Units
2.6.2.1 Military	3.2.1.2 Peripheral Devices
2.6.2.2 Civilian	3.2.1.3 Communications Hardware
2.6.2.3 Contractor	3.2.1.4 Other Hardware
<b>2.7 Unit/Site Operations</b>	3.2.2 Software
2.7.1 System Operation Personnel	3.2.2.1 Ops System Software
2.7.1.1 Military	3.2.2.2 Application (Mission) Software
2.7.1.2 Civilian	3.2.2.3 Interface Software
2.7.1.3 Contractor	3.2.2.4 Comm Software
2.7.2 Utility Requirements	3.2.3 Env & Haz Mat Store & Hand
2.7.3 Fuel & POL	<b>3.3 SQ Phase Out Ops &amp; Spt</b>
2.7.4 Facilities Lease & Maintenance	3.3.1 Hardware Maintenance
2.7.5 Communications	3.3.1.1 Military
2.7.5.1 Long Haul	3.3.1.2 Civilian
2.7.5.2 Intra-Base	3.3.1.3 Contractor Support
2.7.6 Base Operating Support	3.3.1.4 Other
2.7.7 Recurring Training	3.3.2 Software Maintenance
2.7.7.1 Military	3.3.2.1 Military
2.7.7.2 Civilian	3.3.2.2 Civilian
2.7.7.3 Contractor	3.3.2.3 Contractor Support
2.7.7.4 Other	3.3.3 Unit/Site Operations
2.7.8 Miscellaneous Support	3.3.3.1 System Operation Pers
2.7.8.1 Military	3.3.3.2 Utility Requirements
2.7.8.2 Civilian	3.3.3.3 Fuel & POL
2.7.8.3 Contractor	3.3.3.4 Facilities Maintenance
2.7.8.4 Other	3.3.3.5 Communications
<b>2.8 Env &amp; Haz Mat Store &amp; Hand</b>	3.3.3.6 Base Operating Support
<b>2.9 Contract Leasing</b>	3.3.3.7 Annual Operations Invest
	3.3.3.8 Recurring Training
	3.3.3.9 Miscellaneous Support
	3.3.4 Mega Ctr Operating & Maint Spt
	3.3.5 Phase Out Contracts
	3.3.5.1 Leasing
	3.3.5.2 Termination

**Figure B-4 Cont**

GENERIC COST ELEMENT STRUCTURE		
5TH level of Indenture		
<b>1.0 INVESTMENT</b>	1.3.3 Software Development	1.4.1.2 Peripheral Devices
<b>1.1 Program Management</b>	1.3.3.1 COTS Modification	1.4.1.2.1 Printers
1.1.1 Personnel	1.3.3.1.1 Military	1.4.1.2.2 Storage Devices
1.1.1.1 Military	1.3.3.1.2 Civilian	1.4.1.2.3 Other
1.1.1.2 Civilian	1.3.3.1.3 Contractor	1.4.1.3 Communications Hardware
1.1.1.3 Contractor	1.3.3.2 Appl/Mission (Non-COTS)	1.4.1.3.1 Wide Area Gate (Brd Bnd)
1.1.2 TDY	1.3.3.2.1 Military	1.4.1.3.2 Wide Area Networks
1.1.3 Other Government Support	1.3.3.2.2 Civilian	1.4.1.3.3 Modems
1.1.3.1 Military	1.3.3.2.3 Contractor	1.4.1.3.4 Local Area Networks
1.1.3.2 Civilian	1.3.3.3 Comm Software Dev/Mod	1.4.1.3.5 Crypto
1.1.3.3 Other	1.3.3.3.1 Military	1.4.1.3.6 Communications Circuits
1.1.4 Other	1.3.3.3.2 Civilian	1.4.1.3.7 Other Comm Hardware
<b>1.2 Concept Exploration</b>	1.3.3.3.3 Contractor	1.4.1.4 Other Hardware
1.2.1 Engineering Analysis & Specs	1.3.4 System Documentation	1.4.2 System Deployment Software
1.2.1.1 Military	1.3.4.1 Military	1.4.2.1 Operating System Software
1.2.1.2 Civilian	1.3.4.2 Civilian	1.4.2.2 Gen Admin Software
1.2.1.3 Contractor	1.3.4.3 Contractor	1.4.2.3 Tools Software
1.2.2 Concept Exploration Hardware	1.3.4.3.1 Tech Publications	1.4.2.4 Communications Software
1.2.3 Concept Exploration Software	1.3.4.3.2 Engineering Data	1.4.3 Initial Documentation Reqmts
1.2.3.1 COTS	1.3.4.3.3 Management Data	1.4.4 Logistics Support Equipment
1.2.3.2 Other Software	1.3.4.3.4 Support Data	1.4.5 Initial Spares
1.2.3.3 Software Exploration	1.3.5 Data Development & Transition	1.4.6 Warranties
1.2.3.3.1 Military	1.3.5.1 Military	<b>1.5 Outsorce/Centrl/ Mega Ctr Invest</b>
1.2.3.3.2 Civilian	1.3.5.2 Civilian	1.5.1 Capital Investment
1.2.3.3.3 Contractor	1.3.5.3 Contractor	1.5.1.1 Hardware
1.2.4 Concept Exploration Data	1.3.5.4 COTS DBMS	1.5.1.2 Software (COTS)
1.2.4.1 Data Acquisition	1.3.6 Data Base Standards/Dictionary	1.5.1.3 Lease (in lieu of dir Invest)
1.2.4.2 Data Exploration	1.3.6.1 Military	1.5.1.3.1 Hardware
1.2.4.2.1 Military	1.3.6.2 Civilian	1.5.1.3.2 Software
1.2.4.2.2 Civilian	1.3.6.3 Contractor	1.5.2 Software Development
1.2.4.2.3 Contractor	1.3.6.4 Other	1.5.2.1 Military
1.2.5 Exploration Documentation	1.3.7 Training Development	1.5.2.2 Civilian
1.2.5.1 Documentation Acquisition	1.3.7.1 Military	1.5.2.3 Contractor
1.2.5.2 Documentation Exploration	1.3.7.2 Civilian	1.5.3 System User Investment
1.2.5.2.1 Military	1.3.7.3 Contractor	<b>1.6 Sys Init, Implement &amp; Fieldng</b>
1.2.5.2.2 Civilian	1.3.7.4 Other	1.6.1 Initial Training
1.2.5.2.3 Contractor	1.3.8 Test and Evaluate	1.6.1.1 Military
1.2.6 Concept Exploration Testing	1.3.8.1 Development Test & Eval	1.6.1.2 Civilian
1.2.6.1 Testing Acquisition	1.3.8.1.1 Military	1.6.1.3 Contractor
1.2.6.2 Testing Development	1.3.8.1.2 Civilian	1.6.1.4 Other
1.2.6.2.1 Military	1.3.8.1.3 Contractor	1.6.2 Sys Integra, Site Test/Accept
1.2.6.2.2 Civilian	1.3.8.1.4 Other	1.6.2.1 Military
1.2.6.2.3 Contractor	1.3.8.2 Independent V & V	1.6.2.2 Civilian
1.2.7 Facilities	1.3.8.2.1 Military	1.6.2.3 Contractor
1.2.8 Other (Log Spt, Env, etc., as req)	1.3.8.2.2 Civilian	1.6.2.4 Other
<b>1.3 System Development</b>	1.3.8.2.3 Contractor	1.6.3 Common Support Equipment
1.3.1 System Design & Specification	1.3.8.2.4 Other	1.6.4 Site Activation & Facilities Prep
1.3.1.1 Personnel	1.3.8.3 Ops Test & Evaluation	1.6.4.1 Military
1.3.1.1.1 Military	1.3.8.3.1 Military	1.6.4.2 Civilian
1.3.1.1.2 Civilian	1.3.8.3.2 Civilian	1.6.4.3 Contractor
1.3.1.1.3 Contractor	1.3.8.3.3 Contractor	1.6.4.4 Other
1.3.1.2 Other	1.3.8.3.4 Other	1.6.5 Initial Supplies
1.3.2 Dev, Prototype& Test Site Invest	1.3.9 Development Logistics Support	1.6.6 Engineering Changes
1.3.2.1 Development Hdwre Invest	1.3.9.1 Military	1.6.6.1 Military
1.3.2.1.1 Test Site	1.3.9.2 Civilian	1.6.6.2 Civilian
1.3.2.1.2 Development Support	1.3.9.3 Contractor	1.6.6.3 Contractor
1.3.2.1.3 Modification	1.3.9.4 Other	1.6.6.4 Other
1.3.2.1.4 Prototype	1.3.10 Facilities	1.6.7 Initial Logistics Support
1.3.2.2 Dev Software Investment	1.3.11 Environmental	1.6.7.1 Annual Ops Investment
1.3.2.2.1 Gen Admin	1.3.12 Other Development	1.6.7.2 Hardware Maintenance
1.3.2.2.2 Operating Systems	<b>1.4 System Procurement</b>	1.6.7.3 Software Maintenance
1.3.2.2.3 Communications	1.4.1 Deployment Hardware	1.6.7.4 Mega Ctr Maint Support
1.3.2.2.4 DBMS	1.4.1.1 Processing Units	1.6.7.5 Data Management
1.3.2.2.5 Tools	1.4.1.1.1 CPUs	1.6.7.6 Unit Site Ops
1.3.2.2.6 Other (License)	1.4.1.1.2 Intermediate Proc Units	
	1.4.1.1.3 Terminal Proc Units (PCs)	

Figure B-5

GENERIC COST ELEMENT STRUCTURE		
5TH level of Indenture		
1.6.8 Office Furn & Gen Support Furn	2.4.3 Comm Software (Non-COTS)	3.2.1.2 Peripheral Devices
1.6.9 Data Upload & Transition	2.4.3.1 Military	3.2.1.2.1 Printers
1.6.9.1 Military	2.4.3.2 Civilian	3.2.1.2.2 Storage Devices
1.6.9.2 Civilian	2.4.3.3 Contractor	3.2.1.2.3 Other
1.6.9.3 Contractor	2.4.4 Data Center Software	3.2.1.3 Communications Hardware
1.6.10 Base/Installation Comm	2.4.4.1 Military	3.2.1.3.1 Wide Area Gate (Brd Bnd)
1.6.10.1 Military	2.4.4.2 Civilian	3.2.1.3.2 Wide Area Networks
1.6.10.2 Civilian	2.4.4.3 Contractor	3.2.1.3.3 Modems
1.6.10.3 Contractor	2.4.5 Other Software	3.2.1.3.4 Local Area Networks
1.6.10.4 Other	2.4.5.1 Military	3.2.1.3.5 Crypto
1.6.11 Other	2.4.5.2 Civilian	3.2.1.3.6 Comm Circuits
<b>1.7 Upgrade/P3I</b>	2.4.5.3 Contractor	3.2.1.3.7 Other Comm Hardware
1.7.1 Upgrade Development	<b>2.5 Mega Center Ops &amp; Maint Spt</b>	3.2.1.4 Other Hardware
1.7.1.1 Hardware	<b>2.6 Data Maintenance</b>	3.2.2 Software
1.7.1.2 Software	2.6.1 Mission Application Data	3.2.2.1 Ops System Software
1.7.1.2.1 Military	2.6.1.1 Military	3.2.2.2 Application (Mission) Software
1.7.1.2.2 Civilian	2.6.1.2 Civilian	3.2.2.3 Interface Software
1.7.1.2.3 Contractor	2.6.1.3 Contractor	3.2.2.4 Comm Software
1.7.2 Life Cycle Upgrades Procure	2.6.1.4 Other	3.2.3 Env & Haz Mat Store & Hand
1.7.2.1 Hardware Upgrades	2.6.2 Standard Admin Data	<b>3.3 SQ Phase Out Ops &amp; Spt</b>
1.7.2.2 Software Upgrades	2.6.2.1 Military	3.3.1 Hardware Maintenance
1.7.2.3 Other	2.6.2.2 Civilian	3.3.1.1 Military
1.7.3 Central Mega Center Upgrades	2.6.2.3 Contractor	3.3.1.2 Civilian
<b>1.8 Disposal/Reuse</b>	<b>2.7 Unit/Site Operations</b>	3.3.1.3 Contractor Support
1.8.1 Capital Recoupment	2.7.1 System Operation Personnel	3.3.1.4 Other
1.8.2 Retirement	2.7.1.1 Military	3.3.2 Software Maintenance
1.8.3 Environ/Hazardous Disp	2.7.1.2 Civilian	3.3.2.1 Military
<b>2.0 SYSTEM OPS &amp; SPT</b>	2.7.1.3 Contractor	3.3.2.2 Civilian
<b>2.1 System/Material/Item Mgmt</b>	2.7.2 Utility Requirements	3.3.2.3 Contractor Support
2.1.1 Personnel	2.7.3 Fuel & POL	3.3.3 Unit/Site Operations
2.1.1.1 Military	2.7.4 Facilities Lease & Maintenance	3.3.3.1 System Operation Pers
2.1.1.2 Civilian	2.7.5 Communications	3.3.3.1.1 Military
2.1.1.3 Contractor Support	2.7.5.1 Long Haul	3.3.3.1.2 Civilian
2.1.1.4 Other	2.7.5.2 Intra-Base	3.3.3.1.3 Contractor
2.1.2 TDY	2.7.6 Base Operating Support	3.3.3.2 Utility Requirements
2.1.3 Other Government Support	2.7.7 Recurring Training	3.3.3.3 Fuel & POL
2.1.3.1 Military	2.7.7.1 Military	3.3.3.4 Facilities Maintenance
2.1.3.2 Civilian	2.7.7.2 Civilian	3.3.3.5 Communications
2.1.3.3 Other	2.7.7.3 Contractor	3.3.3.5.1 Long Haul
2.1.4 Other	2.7.7.4 Other	3.3.3.5.2 Intra Base
<b>2.2 Annual Operations Investment</b>	2.7.8 Miscellaneous Support	3.3.3.6 Base Operating Support
2.2.1 Annual System Maint. Investment	2.7.8.1 Military	3.3.3.7 Annual Operations Invest
2.2.2 Replenishment Spares	2.7.8.2 Civilian	3.3.3.7.1 Annual Sys Maint. Invest
2.2.3 Replen Supplies & Consumables	2.7.8.3 Contractor	3.3.3.7.2 Replenishment Spares
<b>2.3 Hardware Maintenance</b>	2.7.8.4 Other	3.3.3.7.3 Replen Sup & Consum
2.3.1 Organic Hardware Maintenance	<b>2.8 Env &amp; Haz Mat Store &amp; Hand</b>	3.3.3.8 Recurring Training
2.3.1.1 Military	<b>2.9 Contract Leasing</b>	3.3.3.8.1 Military
2.3.1.2 Civilian	<b>3.0 ALT PHASE OUT</b>	3.3.3.8.2 Civilian
2.3.2 Contract Maintenance Support	<b>(SQ PROFILE)</b>	3.3.3.8.3 Contractor
2.3.2.1 Processing Units	<b>3.1 System Management</b>	3.3.3.8.4 TDY
2.3.2.2 Peripheral Devices	3.1.1 Personnel	3.3.3.9 Miscellaneous Support
2.3.2.3 Communications Hardware	3.1.1.1 Military	3.3.3.9.1 Military
2.3.2.4 Other Hardware	3.1.1.2 Civilian	3.3.3.9.2 Civilian
2.3.3 Other Hardware Maint.	3.1.1.3 Contractor Support	3.3.3.9.3 Contractor
2.3.3.1 Outsource/Mega Center Spt	3.1.2 TDY	3.3.3.9.4 Other
2.3.3.2 Other Govern Agency Spt	3.1.3 Other Government Support	3.3.4 Mega Ctr Operating & Maint Spt
<b>2.4 Software Maintenance</b>	3.1.3.1 Military	3.3.5 Phase Out Contracts
2.4.1 Comm Off-the-Shelf (COTS)	3.1.3.2 Civilian	3.3.5.1 Leasing
2.4.1.1 Operating System	3.1.3.3 Other	3.3.5.2 Termination
2.4.1.2 General Administrative	3.1.4 Other	
2.4.1.3 Tools	<b>3.2. Phase Out Investment</b>	
2.4.1.4 Communications Software	3.2.1 Hardware	
2.4.2 Appl/Mission (Non-COTS)	3.2.1.1 Processing Units	
2.4.2.1 Military	3.2.1.1.1 CPUs	
2.4.2.2 Civilian	3.2.1.1.2 Intermediate Proc Units	
2.4.2.3 Contractor	3.2.1.1.3 Term Proc Units (PCs)	

Figure B-5 Cont.

## **ATTACHMENT C to, DoD Automated Information System (AIS) Economic Analysis (EA) Guide**

### **Benefit Element Structure Definitions**

C-1 Benefit Element Structure. The Guide benefit element structure provided in the spreadsheet model is derived directly from the major cost categories defined in OMB Circular A-11, "Preparation and Submission of Budget Estimates" (See figure C-1). All definitions, cost breakdowns, etc., provided in OMB Cir. A-11 apply to the benefit element structure. The budget cost structure encompasses the entire range over which benefits may be designated.

Data provided in the benefit element structure is presented at the highest summary level and, therefore, must be documented and analytically supported fully down to the level required to show clearly the quantitative relationship - cause and effect in comparison to the Status Quo estimated level of benefits - to the AIS resources identified in the LCC estimate for each alternative. AIS alternative estimated investment and implementation plans must be correlated to specific differences (improvements) in system design and capability that, in turn, will enable change (versus the capability provided by the Status Quo alternative) in functional processes and contribute to mission capability to meet stated mission needs.

Supporting documentation may be provided in the form of business process analysis, FEA or AIS Economic Analysis (AIS EA). The governing requirement is that the supporting documentation must be accurate, complete and conclusive. It should be noted, however, that the mere application of FEA or AIS EA procedures and formats will not necessarily meet benefits documentation requirements.

A separate benefits data spreadsheet will be required for each alternative other than the Status Quo (SQ) alternative. SQ benefits are defined as the baseline capability provided by the existing system at the time of the EA. SQ benefits include all benefits that will result from all the sunk costs attributable to the AIS program. If a prototype system is deployed that provided benefits or an AIS system is partially implemented, associated benefits are the result of sunk cost and must, therefore, be attributed to the SQ benefit baseline posture. SQ benefits must be estimated and documented fully because they provide the comparative zero baseline from which the benefits attributable to the future costs associated with other alternatives are measured.

It is recognized that the SQ alternative may in reality represent a degraded mission posture or even mission failure. The Status Quo concept is used for comparative purposes only and should not be misconstrued to imply that the SQ alternative either provides no benefits or need not be estimated and documented.

- 1.0 Research and Development (OMB Circular A-11, section 44.2)
- 2.0 Personnel
- 3.0 Operations and Maintenance
- 4.0 Procurement
- 5.0 Construction

BENEFIT ELEMENT STRUCTURE									
<b>_.1 Research and Development, Test and Evaluation</b>					<b>_.2 Military Personnel</b>				
_.1.1 Research					_.2.1.1 Officer				
_.1.1.1 Contractor					_.2.1.1 Pay				
_.1.1.2 Government Labs					_.2.1.2 Allowances				
_.1.1.3 Universities					_.2.1.3 Travel				
_.1.2 Modernization					_.2.2 Enlisted				
_.1.2.1 Contractor					_.2.2.1 Pay				
_.1.2.2 Government Labs					_.2.2.2 Allowances				
_.1.2.3 Universities					_.2.2.3 Travel				
_.1.3 Exploratory Development					<b>_.3 Operations and Maintenance</b>				
_.1.3.1 Contractor					_.3.1 Civilian Pay				
_.1.3.2 Government Labs					_.3.2 Contract Services				
_.1.3.3 Universities					_.3.3 Government Services				
_.1.4 Fabrication of Technology					_.3.4 Fuel				
_.1.4.1 Contractor					_.3.5 Spares & Repair Parts				
_.1.4.2 Government Labs					_.3.6 Supplies				
_.1.4.3 Universities					_.3.7 Minor Construction				
_.1.5 Demonstration Devices					<b>_.4 Procurement</b>				
_.1.5.1 Contractor					_.4.1 Equipment				
_.1.5.2 Government Labs					_.4.2 Spares				
_.1.5.3 Universities					_.4.3 Modifications				
_.1.6 Development & Testing of Prototypes					<b>_.5 Construction</b>				
_.1.6.1 Contractor					_.5.1 Improve Living/Working Facilities				
_.1.6.2 Government Labs					_.5.2 Reduce Operating Costs				
_.1.6.3 Universities					_.5.3 Increase Productivity				
_.1.7 Preproduction Hardware					_.5.4 Conserve Energy				
_.1.7.1 Contractor									
_.1.7.2 Government Labs									
_.1.7.3 Universities									

Figure C-1

**ATTACHMENT D to, DoD Automated Information System (AIS)  
Economic Analysis (EA) Guide**

**ECONOMIC ANALYSIS TECHNIQUES**

The techniques used to develop LCC Estimates should take into account the stage of the acquisition cycle that the system is in, or its maturity, when the estimate is made. Until actual costs are available, the use of parametric costing techniques is an acceptable approach to the development of the cost estimates. It is expected that heavy reliance will be placed on parametric, analog, and engineering methods for Milestone II reviews, while projections of specific costs based on test results should be used predominantly for preparing estimates for Milestone III and higher reviews. A comparison of several cost estimating methods is encouraged before selection of the specific technique to be used. Standards and methodologies that may include Cost Estimating Relationships (CERs), may be established or recommended by offices within and outside the program. However, in each case the use of standards, CERs and methods must be analytically justified and documented for each application.

**D-1 CER.** CERs can be anything from a simple statement of a relationship between two variables (one dependent and one independent) to an equation developed statistically using multiple regression analysis with multiple dependent and independent variables, such as:  $COST = Constant + (Factor)WEIGHT + (Factor)SPEED + (Factor)ENDURANCE$ . CERs are normally developed using an historical data base of performance parameters with their relative costs. When Cost Estimating Relationships (CERs), already available or newly developed, are used to make the cost estimates, the specific form of the CER, its statistical characteristics, the data base used to develop the CER, and the assumptions used in applying the CER should be provided as back-up documentation. Limitations of the CER and other CERs considered, but not used, should be discussed. Adjustments for major changes in technology, new production techniques, software development tools or languages, different procurement strategies, production rates, or business base should be highlighted and explained.

**D-2 ANALOGY.** Analogy is a technique used to estimate cost of an unknown item by comparing the unknown to a known item and its costs, such as:

$$\begin{array}{lcl} A = 2B & & A = (\text{Complexity Factor}) * B \\ B = \$3 & \text{or} & B = \$3 \\ A = \$6 & & A = (\text{Complexity Factor}) * \$3 \end{array}$$

For estimates made by analogy or engineering costing techniques (See paragraph D-3), the rationale and procedures used to prepare such estimates must be documented. If an analog estimate is made using complexity factors, the basis for the complexity analysis, including backgrounds of the individuals making the ratings, the factors used (including the ranges of values), and a summary of the technical characteristics and driving cost elements should be provided in backup documentation.

**D-3 ENGINEERING (BOTTOMS UP)** An engineering approach is when a system's costs are derived by estimating the costs of its components and sub-components and summing these costs. For example: A proposed radar is made up of an antenna, a transmitter, and a receiver. The transmitter is made up of a signal generator and a power supply. The signal generator is made up of Circuit Card A, Circuit Card B and Circuit Card C. Circuit Card A costs \$10, Circuit Card B cost \$20, and Circuit Card C cost \$10. The signal generator then costs \$40. An engineering approach should be used

whenever data is available at the subsystem, component or sub-components level of detail. Comparing the proposed components in a "like and similar" (Analogy) analysis, using an existing system to compare actual and estimated costs, provides the most accurate estimate. However, the overall engineering approach is heavily dependent on having a detailed description of the proposed system, a data base of an existing system, and the availability of technical experts to assist in the analysis.

**D-4 PROTOTYPE** Actual cost experience on prototype units, early engineering development hardware and software, and early production hardware for the program under consideration, should be used to the maximum extent possible, recognizing that prototype units are frequently "hand made", do not necessarily reflect actual production methods or materials, and would need adjusting. If development or production units have been produced, the actual cost information should be provided as part of the back-up. In the event that a program has been preceded by an unsuccessful effort to achieve similar benefits, the reasons for the failure of the preceding program and associated costs must be included in the analysis of the program under review.

**D-5 SELECTING RELEVANT COSTS** A Cost Element Structure (CES) establishes a standard vocabulary for identifying, classifying and presenting the major costs. The standard CES, with definitions, is provided in Chapter 8. It is designed to reasonably cover the life cycle costs, however, special circumstances may introduce relevant additional costs. Collateral costs for such activities as extensive software revisions, procurement of hardware, special facilities requirements, and handling considerations could be pertinent to some major AIS programs. Therefore, any significant unique cost should be addressed based on an examination of all relevant costs. If a decision will affect costs not explicitly described, such cost should be identified, estimated and displayed in the life cycle cost estimate. The derivation of cost estimates is important to the decision process, whether it be for a budget submission or the development of an LCC estimate for a MAISRC review. Most often the figures presented outlive their intended use and are used in many other applications until replaced by a more recent estimate. Therefore, each element within the cost element structure should be estimated and addressed with the most rigor which resources, time and available data will allow. However, not all of the cost elements require or deserve the same attention. The greatest analytic effort should be devoted to those elements accounting for a substantial part of the total life cycle cost; those that can be affected by acquisition program decisions; those that entail the greatest risks; or those that assist in distinguishing between alternatives.

**D-5.1 Quality of the Cost Estimate.** While it is the cost analyst's responsibility to achieve the greatest accuracy possible in developing cost estimates, it is recognized that there is a practical limit to the amount of resources that can be applied to the effort. In addition, the application of the cost estimate often determines the method used to derive the estimate. For example, one would not, normally, use an engineering, bottoms up approach at Milestone I for deriving Initial Spares requirements, when system definition is lacking; nor would one use a macro system CER to support a decision on the maintenance concept of a sub-component.

Professional judgment must be used when determining the accuracy required, the methodology to use, and the resources to apply in deriving the specific cost estimate. The approach to be taken should be discussed with the OSD (PA&E) analyst during the meeting described in paragraph 3.2.4.1, this Guide.

D-5.2 Transition Period. When a program includes multiple systems which will be produced/delivered/installed incrementally, there will be a period in the life cycle when units have been transitioned to the user and are operating while other units are still being produced. This occurs between Initial Operational Capability (IOC) and Full Operational Capability (FOC). During this time costs are incurred in the Investment (CES 2.0) by the Program Manager and Operating & Support (CES 3.0) by the user. It is important that all these costs be included in the life cycle costs.

In addition, some emerging systems must be operated in parallel with the systems being replaced. During system check-out or shake-down both systems incur operating costs which could be significant. These dual operating costs should also be included in the life cycle costs.

D-5.3 Constant Dollars. All costs are reflected in constant year dollars and use the current year as the base year. All benefits are also reflected in the same constant year dollars.

D-5.4 Prior Year (Sunk) Costs. The sunk costs of a system are those costs which are already expended or obligated and which cannot be impacted by the decision to be made - those costs which will not change if the decision is made to cancel the program.. The total sunk costs for each of the elements in the CES should be displayed in a separate spreadsheet and included in the LCC. These costs should be displayed from actual or programmed start date to the current fiscal year. While it is important to include these costs in the LCC, they should not be included in a Cost and Operational Effectiveness Analysis, trade-off analysis, or decision focused analyses.

**D-6 CONSTRUCTING A COST MODEL** There are several acceptable ways of generating the various parts of a life cycle cost estimate; no one approach is best for all cost elements or all situations. In general, the context of the problem determines the optimal cost estimating process. Context includes: the phase of the acquisition program; the decision to be made; the accuracy and resolution required in the estimate; and, the data available. Cost models can provide significant assistance to the analyst in accomplishing repetitive tasks, reviewing complex relationships, and comparing costs among competing alternatives. They can range from a simple accounting spreadsheet to a sophisticated automated software package with embedded regression analyses and CERs. However, no model can accomplish the analysis needed to ensure that the inputs to the model are accurate, that the model output is logical and supportable, or that the model is appropriate for a specific application.

A good model will have the following characteristics:

D-6.1 Simplicity. Complexity is not always desirable in a life cycle cost model. The cost, labor hours, and schedule required to set up and provide data for a complex model may prohibit effective and timely use in the decision process and, therefore, must be evaluated against the degree of accuracy and flexibility that the complexity usually provides. The model should be structured so that it can be useful in the early phases of the acquisition process and can evolve to accommodate more information as the program continues through its life cycle. In addition, the model should not mask critical assumptions or methodologies that may be driving the outputs of the model.

D-6.2 Consistency in the CES. The basic cost structure should not change as a program progresses through the development and procurement process. However, the basic elements and their sub-elements should be defined and displayed to greater levels of detail. For this reason, the cost structure provided is hierarchical, that is, the sum of each set of lower indentured elements equals the

next higher indented element. In this manner, the cost structure allows flexibility in selection of the level and method by which an element is estimated.

**D-6.3 Consistency in Data Elements.** The data elements of the cost estimates should be consistent with similar elements of each alternative. The data should be derived from the most reliable or credible data base for a given cost element.

**D-6.4 Flexibility in Estimating Techniques.** An estimating model should allow the element estimating techniques to vary as the program progresses through the acquisition phases. For example, when cost data is scarce, it may be possible to estimate only major elements of cost using a statistical CER. However, as more detailed information becomes available, some of these estimates may be developed by engineering analysis, while others may still require CER or some form of scaling. Ultimately, as sufficient data becomes available, most design-sensitive parameters should be developed by engineering analysis.

**D-6.5 Software Models.** Models for estimating application software development cost and sizing should be calibrated only with data from completed, validated and tested programs to include overall system integration. Further, calibration data for software development must be exhaustive to include administrative and/or overhead (project management, etc.) facilities, equipment, tools, training, learning and orientation, analysis and design, coding, test and validation, system integration, implementation, documentation, government furnished equipment and services, related studies and research, leased support and estimated fully burdened manpower costs required to complete development.

**D-7 USEFULNESS TO THE DESIGN PROCESS.** While the estimating of cost for the program reviews is an important function, application of cost estimating techniques and models to day-to-day program management and in support of the decision process, is equally important. These cost estimating methods should be sensitive to the full range of development, test, procurement and O&S initiatives, and changes that will impact a major system during the various phases of the acquisition process.

**D-8 TREATING UNCERTAINTY.** Estimates of cost for programs are beset by uncertainties from many sources. Therefore, it is useful to perform sensitivity and risk analyses that show the magnitude of the uncertainty and risks; and, explain the method used to establish range boundaries. When quantification of uncertainty proves impractical, a qualitative assessment of the variation should be made.

**D-9 SENSITIVITY.** The sensitivity of projected costs to critical program assumptions should be examined. This should include factors such as: learning curve assumptions; technical risk or failures (requiring more development effort); changes in performance characteristics; schedule alterations; and, variations in testing requirements. These considerations apply particularly to software development and system integration.

**D-10 MULTINATIONAL.** Program estimates involving multinational acquisitions should include the impact on cost to the US. Government of license fees, royalties, transportation costs, and expected foreign exchange rates, as appropriate.

**D-11 BACK-UP DOCUMENTATION.** A life cycle cost analysis, in order to be understood, must contain an adequate description of what is being estimated. Even a simple system with little outside impact, must contain a description of the elements which constitute the system, the operating environment, and the assumptions which are the basis for the cost estimate. A system with an assumed 10 year life cycle can be expected to generate one half of the operating cost of that same system with an assumed 20 year life cycle or a system operating 12 hours/day over the same system with a 24 hour/day operating schedule. Unless these factors are explicitly presented, differences in the cost estimates cannot be defined nor can impacts of budget variances be determined.

In order to ensure that all estimates of the life cycle costs are comparable and the impacts of budget actions understood, the Program Manager should include an extract of the CARD in his life cycle cost estimate covering the underlying characteristics, cost drivers, ground rules, and operational considerations used as a basis for the his/her cost estimate. These factors will also provide the basis for the ICE, unless the independent cost agency takes exception to a parameter.

This section of the life cycle cost analysis should be updated as elements change and more details are determined. Like the cost estimates, the level of detail contained in this section can be expected to change as the system matures from Milestone II through Milestone IV.

This section should be completed/updated prior to the meeting with OSD (PA&E) covered in paragraph 3.2.4.1, this Guide, of this guidance and contain, at least, the elements which follow.

**D-11.1 System Overview.** The system overview should contain: the system configuration, its function(s), its relationship to ancillary systems, key performance parameters, system characteristics, technical and physical description (an artist concept or photograph, if available, should be included), environmental impacts expected, and manufacturing material, processes, parts, workmanship, and commonalty.

**D-11.2 Software Description.** The functional software, operating system software, and Commercial off-the-shelf (COTS) software should be identified to include a functional description, method used to define the scope of the development effort, coding languages to be used, method to be used in developing software (Government or contractor), amount of new/reformatted/transferred software, degree of commonality, and the models used to derive the cost estimate (with reasons for selection, input variables used, and printouts of model results).

**D-11.3 Human Performance Engineering.** Included in this section should be the special or unique human performance and engineering characteristics.

**D-11.4 System Quality Factors.**

- Availability - Define, in quantitative terms, the availability goals for the system and specific functions of the system at the start of the system's life and specific points in time throughout the life cycle.
- Reliability - Include the reliability factors/goals (Mean Time Between Failure) or the system and components which will be necessary to attain the availability goals set.
- Maintainability - Include the maintenance factors which will drive system maintenance costs.
  - Maintenance Man-hours per Operating Hour
  - Mean Time to Repair

- Mean Time Between Maintenance Actions
- Maintenance Man-hour per Overhaul
- Reaction Time/Turn Around Time/Maximum Down Time
- Transportability - Include unique transportation factors which will generate costs, such as, return of components for repair/overhaul.
- Other - Include other quality characteristics not previously covered, such as, embedded redundancy, surge capacity, or inter-operability.

D-11.5 Organizational Concept. Include the system support structure (organizational diagram), deployment locations (state, national, and world maps), and interface with the user communities.

D-11.6 Logistics. Include the maintenance support concepts (Government or contract - on site or off site), sparing and pipeline considerations, Integrated Logistics Support and Interim Logistics Support considerations, support equipment requirements, and re supply structure.

D-11.7 Training. Include the training structure and organization needed to field and support the system. Factory training requirements, maintenance trainers, and the use of simulators should also be addressed.

D-11.8 Delivery and Installation. Include the schedule for delivery and installation, by year. Normally, it is assumed that 50% of the systems delivered/installed in any given year will generate operating costs for that year. A master schedule should also be included showing major events by phase, Milestones, contract awards, design reviews, test events, concurrent development efforts, initial operational capability, full operational capability, etc.

D-11.9 System Activity. Include the level of activity of the system and/or sub-system after reaching maturity: operating hours, number of shifts, scheduled downtime, overhaul interval, etc.

D-11.10 Inter-Agency Support. Include a discussion on inter-agency support (funded or unfunded), Memorandum of Understanding (MOUs), co-development efforts, co-use of facilities, joint ventures, etc.,

D-11.11 Facilities Construction. Include a discussion of any construction projects or real property acquisition required to facilitate system development or operation .

D-11.12 Manpower Requirements. The total manning requirements of the system and the manning impacts of the system on the user community are one of the major cost drivers (and benefits) of any system and one of the more difficult elements to fully understand or to develop cost estimates. It is, therefore, necessary to review the system manning requirements and impacts in great detail.

The projected annual manning requirements of the system, both at the total system and unit level, after FOC and when the system reaches maturity, should be identified as reflected in Figures D-1 and D-2. Each time a delta figure is shown, plus or minus, this difference should be fully explained in a narrative attachment. Discuss, specifically, how the proposed system will change the manning requirements and the time phasing of these changes, if appropriate. Include the system total, by year, as an element of the delivery and installation schedule discussed in paragraph D-11.8.



<b>SYSTEM X MANNING REQUIREMENTS SYSTEM MANNING</b>				
<b>POSITION</b>	<b>PAY GRADE</b>	<b>STATUS QUO REFERENCE SYSTEM</b>	<b>PROPOSED ALTERNATIVE</b>	<b>DELTA</b>
<b>SYSTEM MANAGEMENT</b>				
Program Manager				
1				
2				
. . .				
System Engineer				
1				
2				
. . .				
Configuration Manager				
1				
2				
. . .				
Logistics Manager				
1				
2				
. . .				
<b>SYSTEM OPERATIONS</b>				
Oversight				
1				
2				
. . .				
System Operators (Breakout to each functional level)				
1				
2				
. . .				
Maintenance (Breakout to the lowest level available)				
Unit Level				
1				
2				
. . .				
Intermediate Level				
1				
2				
. . .				
<b>SUB-TOTAL</b>				
<b>USER COMMUNITY</b>				
Oversight				
1				
2				
. . .				
User Unique Function (Breakout by Function)				
1				
2				
. . .				
Scientific Personnel (Specify Government, academic, general public)				
1				
2				
. . .				
Other				
1				
2				
. . .				
<b>TOTAL</b>				

**Figure D-1**

<b>SYSTEM X</b> <b>MANNING REQUIREMENTS</b> <b>UNIT LEVEL MANNING</b>				
<b>POSITION</b>	<b>PAY GRADE</b>	<b>STATUS QUO REFERENCE SYSTEM</b>	<b>PROPOSED ALTERNATIVE</b>	<b>DELTA</b>
<b>SYSTEM MANAGEMENT (Prorated)</b>				
Program Manager				
1				
2				
. . .				
System Engineer				
1				
2				
. . .				
Configuration Manager				
1				
2				
. . .				
Logistics Manager				
1				
2				
. . .				
<b>SYSTEM OPERATIONS</b>				
System Operators (Breakout to each functional level)				
1				
2				
. . .				
Maintenance (Breakout to the lowest level available)				
Unit Level				
1				
2				
. . .				
Intermediate Level				
1				
2				
. . .				
<b>SUB-TOTAL</b>				
<b>USER COMMUNITY</b>				
User Unique Function (Breakout by Function)				
1				
2				
. . .				
Scientific Personnel (Specify Government, academic, general public)				
1				
2				
. . .				
Other				
1				
2				
. . .				
<b>TOTAL</b>				

**Figure D-2**

## ATTACHMENT E to, DoD Automated Information System (AIS) Economic Analysis (EA) Guide

### BENEFIT ANALYSIS TECHNIQUES

**E-1 INTRODUCTION.** The internal cost of each alternative must be compared to the Status Quo (existing system) costs to obtain the true (delta) cost of implementing or modifying a system. An alternative may also impact external costs by changing the productivity of either a system or the overall force structure.. This can be viewed as doing more functions with a reduced budget or workforce.

Each alternative, including the status quo, provides an external functional capability. The challenge is to: determine the specific functions that are supported, identify the products that support the functions and determine the unit value, in dollars, for each product. The impact of a proposed alternative is derived by comparing its capacity to accomplish the mission to that of the status quo. In order for increased mission capacity to be beneficial however, the impact of the increased capacity on the force structure should be considered and it must be determined that the increased capacity is required for the function. Ability to accomplish the task is the basis for determining the value added, and that value must not exceed the cost of not doing the job at all.

In addition, alternatives may allow the performance of additional functions. If this capacity is required in the functional or mission area, the value of having more functions accomplished may more accurately indicate system benefits and should be determined. In such a case, we must determine the value of having more, and perhaps better, information sooner. This may be expressed as the ability to accomplish other tasks, i.e., decrease dead time or time people wait for information, more accurate forecasts or more timely weather information. We must assess the value of non-delay for people (system assist managers). Further, we must evaluate the extended value of the more expeditious action to those technicians waiting for service.

The impact of better information to make better, more timely decisions can be difficult to assess. The greatest success in quantifying this impact is often most easily understood in terms of the cost to the general welfare: in weather forecasting terms, of error in the snow fall forecast, a delay in a severe weather advisory or an error in the track of a hurricane. The value of these services in avoiding property damage and human suffering is readily apparent. However, the real issue is the delta service between the status quo capabilities and the proposed systems capabilities. It may be the difference in a 4-inch vs. a 6-inch snowfall forecast or a 4-hour severe weather warning vs. a 3-hour warning, or a 50-mile difference in the hurricane track; or, it may be in the length of time a patient must wait for prescription drug pickup. This comparative analysis process is shown in figure E-1. The process, as it is computed within the spreadsheets, is shown in figure E-2.

As a practical display of the possible marginal contribution of an AIS improvement to mission capability, we have provided an "Artillery Rounds" at target example as shown in Figure E-3. The status quo AIS supports artillery target acquisition with an elapsed time between target acquisition and artillery round fired of one half hour. The existing AIS costs \$20 million per year to sustain and requires a force structure of \$200 million per year including artillery equipment, ammunition and personnel to accomplish the required mission with a 95% probability of success. The proposed AIS will require an up-front investment of \$250 million and require an average of \$15 million to operate and support each year. Internal AIS comparative costs (with no adjustments) would be Status Quo for 15 years = \$300 million (\$20M x 15) (O&S). The preferred AIS = \$225M (\$15M x 15)(O&S) + \$250M (R&D + Investment) = \$475 Million. Having implemented the preferred alternative however,

it is determined that the time elapsed from target acquisition to rounds fired will be reduced to 10 minutes vice 30, thus improving the probability that a round will kill the target by 30%. This could be translated to indicate (potentially) a 30% reduction in the number of rounds that must be fired to kill each target. The result could be a substantial reduction in the \$200M force structure required to support the functional mission or \$60M per year after the preferred AIS is fully implemented. If we assume it will take 5 years to implant a fully operational AIS, then the proposed system and the standard (O&S) period of 10 years could save \$600M in force structure costs. Hence, a gross unadjusted life cycle cost comparison of the two alternatives would be:

Status Quo	=	\$300M for 15 years O&S and \$3.0B for Required Force Structure
		vs.
Preferred Alternative	=	\$250M for R&D and Investment \$225M for 15 years O&S and \$2.1B for Required Force Structure

The net result is a total cost of \$3.3B to support the status Quo versus \$2.58B to support the preferred Alternative for a gross life cycle savings of \$720M. In this example mission capability remained constant, however, it should be noted that the force structure could have been held constant and the comparative value of added required mission capability could have been calculated. Obviously more targets could be killed using the Status Quo AIS and additional force structure, i.e., more people, canons, ammunition, etc. Assuming the efficiency of the status quo would be constant if the force structure was augmented by 30%, then 30% more targets could be killed. Hence

Status Quo	=	\$300M for 15 years O&S and \$3.0 B for Status Quo Force Structure, plus <u>\$900M</u> for Augmented Force Structure \$4.2 B TOTAL
Preferred Alt	=	\$250M for R&D and Investment and, \$225M for O&S and, <u>\$3.0 B</u> for Force Structure \$3.475B TOTAL

It should be noted, however, that the marginal efficiency of the preferred alternative is, in this example, assumed to be 100%, i.e. every potential dollar can be saved. This constitutes a theoretical savings and a direct causative relationship between mission capability and AIS efficiency. In reality, even though we may validate potential savings based on theory, such estimates must be decremented to reflect the likelihood that in the real-world many other factors may reduce the impact of an improved AIS and, therefore, potential savings must be carefully reviewed by operational commanders to ensure that force reductions do not result in unacceptable degraded mission capability.

The system definition and standard life cycle definition are applicable to benefits determination and the Cost Benefits Analysis (CBA) process. Benefits should flow from clearly stated definitions of system outputs directly linked to the mission, should include the viable alternatives, be exhaustive and include all program alternative costs. Benefits should be quantitatively expressed in order to be considered in the CBA. Sunk or partial program costs already incurred and their associated benefits must be attributed to the status quo baseline alternative.

Formal benefits analysis of alternatives should be developed for all major programs at the initial budget submission and for all presentations thereafter. If funds have been allocated to a system's development prior to mission need approval, economic analysis documentation, as required by the budget, should be provided for review .

**E-2 IDENTIFYING BENEFITS.** The program manager should first list the benefits for each alternative. Benefits should relate to specific targets, such as, organizational goals, objectives, missions, and functions, that are directly related to the system implementation/deployments and the costs incurred. Initially, the list may also include items which cannot be quantified. A discussion of such benefits should be included in accordance with the guidance provided under Non-Quantifiable Benefits.

A useful method for the identification of benefits is the Delphi technique, forming a group of users, managers, and professionals with knowledge of the project being analyzed. This group can identify the possible benefits of the project. They can then identify the extent to which each alternative provides different benefits. The more input, the greater likelihood that the functional manager will include all important benefits. In addition, group analysis is helpful in understanding the significance or insignificance of non-quantifiable benefits.

This activity should result in a list of benefits that will be useful in evaluating the various alternatives. Non-quantifiable benefits should then be deleted from the list. Figure E-4 provides a list of categories which may help to define benefits. This list is not all inclusive; it is only illustrative of benefit categories that could be applicable to a system.

### **E-3. QUANTIFIABLE BENEFITS.**

E-3.1. Sources of Information. Research is necessary in order to locate and document sources of useful information to support the determination and allocation of monetary values to quantifiable benefits. In accomplishing this task it may be useful for the program manager to think of benefits in two major groups: cost reduction and value enhancements. Cost reduction benefits result from improved operations. They are the benefits typically identified with the system. Value enhancements are benefits that result from an increase in services to the organization or the organization's clients, e.g., more timely response to inquiries. These benefits are service improvements not provided by the status quo alternative.

E-3.2. Measuring Quantifiable Cost Related Benefits. The functional manager or analyst can directly measure many benefits in monetary terms. For example, projects for modernization or replacement of existing equipment can generate operating and support savings relative to the status quo. This benefit is quantifiable in direct monetary terms.

Replacing a particular task, function, or piece of equipment is another common benefit. For example, the administrative lead time or delay can be reduced, freeing up resources, and the pipeline can be reduced resulting in less resources needed to fill the pipeline. A remote job entry station can replace the central data entry operation with a resulting cost reduction. Productivity and accuracy gains through on-line entry may also translate into personnel saving (value enhancement).

Benefits which are not specifically monetary, but quantifiable, can often be converted into equivalent monetary values with varying degrees of difficulty. They include benefits such as labor savings and error reduction. An efficiency/productivity increase, typically expressed in man-years, is a benefit whose value includes all direct and indirect labor costs. Direct labor costs are civil service

salaries or hourly wages, while indirect labor costs include allowances and civil service leave and fringe benefits to reflect the full cost of providing a man-year of labor. Documented civil service net personnel reductions is the best evidence of such savings.

One value enhancement that is frequently important is the avoidance of future costs. Cost avoidance are future costs that will not be incurred by selecting a proposed alternative, but would be if the status quo remained. For example, consider a manual process with an increasing workload. Automating the process would avoid the cost of assigning or hiring additional staff required by the manual process to handle the increased workload. However, cost avoidance issues frequently come forward as low confidence benefits. It should be noted that, in today's funding and manpower environment, there is no guarantee that the status quo will be given the priority necessary to obtain the resources that are allegedly being avoided by going with a specific alternative. In some cases, personnel reductions are mandated and the alternative would allow the program to achieve functional requirements with reduced personnel.

The analyst must be careful not to double-count cost saving and benefits. In the case of cost avoidance issues, costs may be included either as a reduced life cycle cost or as a benefit. For example, if the LCC estimate of the alternative is based on reduced operating personnel and costs, then these personnel and cost reductions should not also be shown as a benefit.

**E-4. DISCOUNTING AND PRESENT VALUE.** It is necessary to express the benefits and costs of different alternatives in terms of their present value. The benefits and costs of each alternative are likely to occur at different points in the analysis period. How does a decision maker compare different benefits and costs when they occur at different intervals? Present value analysis allows an analyst to convert benefits and costs occurring at different times to their current (i.e., present) value.

E-4.1 Present Value. Present Value Analysis is based on two principles:

- Benefits occurring in the future are worth less than the same level of benefits that accrue now; and,
- Costs that occur in the future are less burdensome than costs that occur now.

Present Value Analysis assumes that a dollar received today is worth more than a dollar received tomorrow. A dollar invested today begins to earn interest immediately. A dollar received in the future cannot earn interest until it is invested. The difference in present value is the amount of interest earned by the dollar invested today, before the future dollar can be invested.

The base year (Current Year) must be used to establish the time difference point for present value calculations. If any other year is used as a frame of reference the result would not be **Present Value**. The present value analysis allows the value of future years benefits and costs to be calculated as if they all occurred in this year.

Calculating the present value of benefits and costs is called discounting. This calculation multiplies the benefits and costs by a factor referred to as the discount rate, or opportunity cost of capital. A discount factor is a predetermined factor based on the established discount rate and time period. Discount factors to be used are determined by OMB and are published annually as prescribed by OMB circular A-94.

E-4.2. Net Present Value. Reducing all quantifiable benefits and costs to present value allows a comparison of the various alternatives. The most straightforward comparison is Net Present Value (NPV).

NPV is the difference between the present value of the benefits and the present value of the costs, or:

$$NPV = PV(\text{benefits}) - PV(\text{Costs})$$

An example of the computations is shown in Figure E-5.

**E-5. RETURN ON INVESTMENT (ROI).** AIS ROI is the ratio of the present values of the additional cost to the Government to implement a program alternative in lieu of the Status Quo, to the cost of performing the mission (s) or accomplishing the business functions (over the post FOC life cycle of the AIS) impacted by the AIS program if the AIS program is implemented in lieu of the Status Quo.

$$\frac{\text{Cost to do Mission}_{Alt} - \text{Cost to do Mission}_{SQ}}{\text{Cost to Implement}_{Alt} - \text{Cost to Maintain}_{SQ}}$$

E-5.1 Present Value of Future Investment of Alternative (PV<sub>fia</sub>) The PV<sub>fia</sub> is the total future cost to the government to implement and sustain an AIS alternative from the current time to the time to attain Full Operational Capability (FOC) at all operational sites plus the cost to sustain and operate the Status Quo until it is phased out at all operating sites.

E-5.2 Present Value of Future Investment of Status Quo (PV<sub>fisq</sub>) The PV<sub>fisq</sub> is the total future cost to the government to maintain and sustain the Status Quo alternative over the same period as the PV<sub>fia</sub>.

E-5.3 AIS Future Investment (AIS<sub>fi</sub>) The AIS<sub>fi</sub> is the delta between the PV<sub>fia</sub> and PV<sub>fisq</sub>.

or:

$$AIS_{fi} = PV_{fia} - PV_{fisq}$$

E-5.4 Present Value of Future Mission Cost per Alternative (PV<sub>fmca</sub>) The present value of the total future cost to the Government (excluding PV<sub>fisq</sub>) required to meet stated mission requirements over the remaining life cycle of the alternative if the alternative is successfully implemented.

E-5.5 Present Value of Future Mission Cost per the Status Quo (PV<sub>fmcsq</sub>) The present value of the total future cost to the Government (excluding PV<sub>fisq</sub>) required to meet the same mission requirements over the same remaining life cycle of the alternative if the Status Quo is maintained.

E-5.6 AIS Future Mission Cost (AIS<sub>fmc</sub>) The AIS<sub>fmc</sub> is the delta between the PV<sub>fmca</sub> and PV<sub>fmcsq</sub>.

or:

$$AIS_{fmc} = PV_{fmca} - PV_{fmcsq}$$

E-5.7 Present Value of Future Mission Benefits of the Alternative ( $PV_{fmbsa}$ ) The total benefit to the Government is defined as the present value of the difference in the mission or business area costs other than  $PV_{fia}$  that result directly from, or are made possible by, the implementation of the alternative vice the continued operation of the Status Quo from the current time through the remainder of the life cycle of the alternative.

E-5.8 Present Value of Future Mission Benefits of the Status Quo ( $PV_{fmbsq}$ ) In most cases it is impractical to measure the total benefits of the Status Quo. However, it is sufficient to measure the delta between the Status Quo (As Is) and the Alternative (To Be). The economic issue is not the cost/benefits of accomplishing the mission or not accomplishing the mission. At issue is the cost difference between accomplishing the mission using the Status Quo system versus accomplishing the mission using the alternative system. Therefore, as an expedient, the Status Quo benefits can be considered as the zero baseline. Alternative benefits are measured against the Status Quo, which is what is shown in paragraph E-5.7. This does not mean that there are no benefits derived from the Status Quo. If this were true, then the Status Quo system must be terminated immediately. Rather, it means that for an alternative result to be considered a benefit it must be more beneficial than the result offered by the Status Quo. Further, the alternative benefit is only that amount of the result that exceeds the Status Quo baseline result.

E-5.9 AIS Future Mission Benefits ( $AIS_{fmb}$ ) The  $AIS_{fmb}$  is the delta between the  $PV_{fmbsa}$  and  $PV_{fmbsq}$ .

$$\text{or}$$

$$AIS_{fmb} = PV_{fmbsa} - PV_{fmbsq}$$

E-5.10 AIS Return on Investment ( $AIS_{ROI}$ ) The  $AIS_{ROI}$  is the primary quantitative metric used to determine the value or relative merit of an alternative. It is the ratio of the sum of the AIS Future Mission Benefits ( $AIS_{fmb}$ ) to the AIS Future Investment ( $AIS_{fi}$ ).

$$\text{or}$$

$$AIS_{ROI} = AIS_{fmb} \div AIS_{fi}$$

## **E-6 ESTIMATING NON-QUANTIFIABLE BENEFITS**

E-6.1 Applicability. Non-quantifiable and non-cost related benefits, although not applicable in a cost analysis, may be important in the decision process. The objective of the cost and benefits analysis is to provide information that can be used in arriving at the proper decision. While the most easily assimilated information is that which is quantified, a subjective analysis of the intangible benefits could be important and should be included as part of each analysis.

As noted previously, the functional manager is first obligated to complete a benefits analysis for each program alternative under consideration. A quantifiable benefits estimate and economic analysis is also required for each alternative with the initial budget submission for the program. The functional manager may also consider including an estimate on non-quantifiable benefits in the report.

The estimate of non-quantifiable benefits and any accompanying additions to the cost/benefit analysis will be provided to the MAISRC with comments as deemed appropriate.

E-6.2. Estimating Non-Quantifiable Benefits. The estimation of non-quantifiable benefits may be made easier if they can be categorized systematically and then compared within categories. Characteristics such as product or service performance or work environment can sometimes be proposed in quantifiable terms but the confidence in these values may be low. In such cases, direct comparison among these measures should be undertaken. In other cases, a narrative description of the characteristics of the non-quantifiable benefit may be the most that can be done. Benefits of this type associated with most programs may include, but are not limited to:

- Improved Decision-Making
- Better Management Information
- Greater Versatility or Flexibility
- Better Presentation of Information
- Improved Report Generation (Timeliness)
- Improved Staff Morale

There are a number of useful procedures for estimating non-quantifiable benefits. Many benefits not readily converted to a dollar figure can be expressed in a common unit of measure (such as percentage satisfaction with services provided). The analyst can compare alternatives when similar benefits are expressed in a common measure. The procedure used to evaluate non-quantifiable benefits depends on the purposes, scope, and size of the project. For many projects, enumeration and ordinal ranking is sufficient. For larger projects, more complex techniques may be necessary to provide complete information. The discussion below describes several techniques that may be used in evaluating non-quantifiable benefits.

E-6.2.1 Simple Techniques for Evaluating Non-quantifiable Benefits. Enumeration is a "simple listing" of non-quantifiable benefits associated with each alternative. This allows for a comparison of non-quantifiable benefits associated with each alternative.

Ranking non-quantifiable benefits by their relative importance to the goals and objectives of the initiative provides a more useful piece of information. Such a ranking describes the degree to which each alternative achieves a given objective. The ranking does not imply a strict quantification of the non-quantifiable benefits. However, it provides a description of all benefits and how each contributes to the project's goals. This analysis is, by nature, rather subjective and requires a consensus on the relative importance of the non-quantifiable benefits. In many cases, this is as far as the analysis can go -- to include certain non-quantifiable benefits in the estimate. However, the ranking explicitly identifies the differences among alternatives.

An additional step that can supplement ranking is scoring each alternative on how it contributes to the non-quantifiable benefit. These scores are subjective estimates derived from a meeting of users, managers, and professionals with knowledge of the system, or simply the analyst's judgment. Scoring the alternative provides a means to compare across alternatives on individual non-quantifiable factors.

A third approach to quantifying benefits is assigning values. This technique involves ranking all benefits, both quantifiable and non-quantifiable, by their relevance to project objectives. First, the analyst establishes dollar values for the quantifiable benefits. The analyst

then assigns dollars values to the non-quantifiable benefits based on their position in the rankings. Figure E-6 illustrates the process of assigning values. This procedure is a subjective exercise and assumptions underlying the dollar values for the intangible benefits need to be explicitly stated.

E-6.2.2. Complex Techniques for Evaluating Non-quantifiable Benefits. A fourth technique that is useful for larger projects builds on the ranking procedures shown in Figure E-7. This technique weights the non-quantifiable factors based on their priority or contribution to organization goals. It may include quantifiable benefits, but it is not required. The first step is to establish the benefits. Second, the Program Manager, users, decision-makers, and the cost analyst define the list of benefits for the project and establish a relative weight for each benefit from 1 to 10. (Weights show the relative importance of each benefit to the organization's goals. Other more complex weighting systems may be used.) They then rate each benefit on how it contributes to the organization's objectives. The cost analyst or a committee familiar with the project now scores each alternative against each benefit. The score is a judgment of how well each alternative satisfies the non-quantifiable benefit. Figure E-7, shows the average score for Alternative B is 329. The alternative's score, multiplied by the weight of each benefit (column 3 times column 4), provide a weighted score for each benefit (column 5). The alternative's final score is the sum of weighted scores for each benefit.

The final alternatives scores, along with the quantified results, can be used to compare the merits of the alternatives.

Cost/Benefits Comparative Process

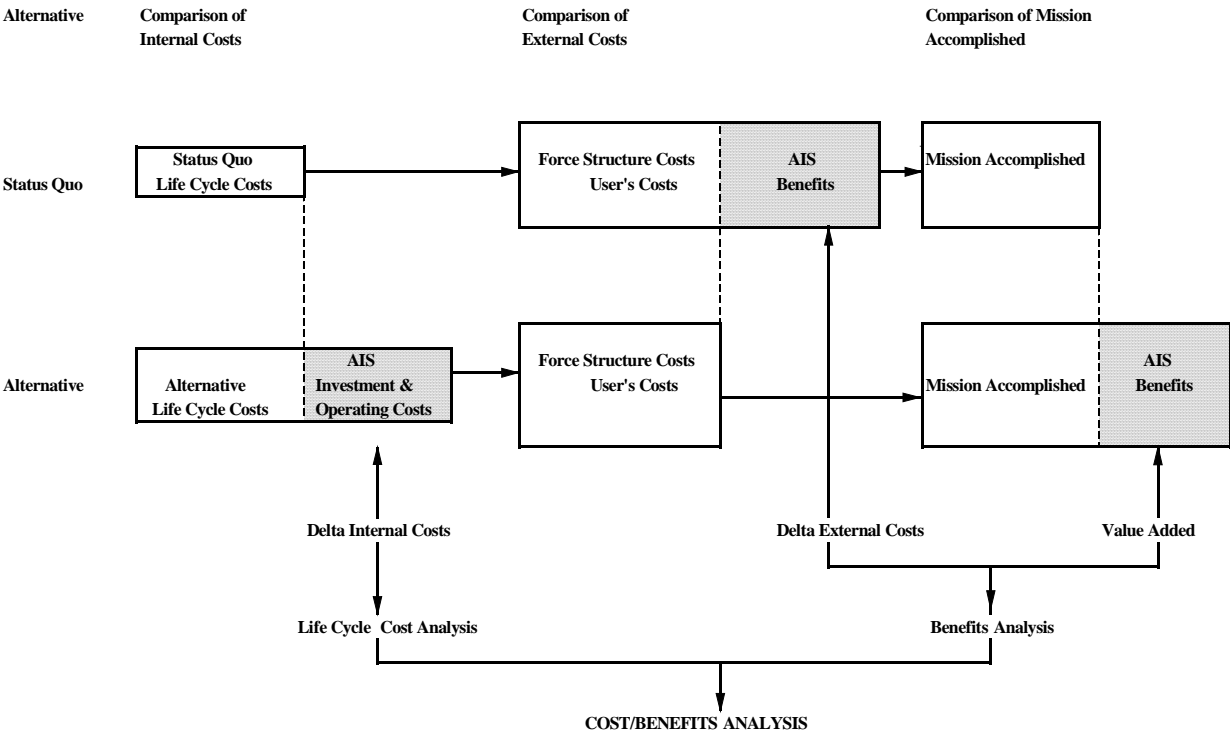


Figure E-1

## AIS Acquisition Program Economic Analysis

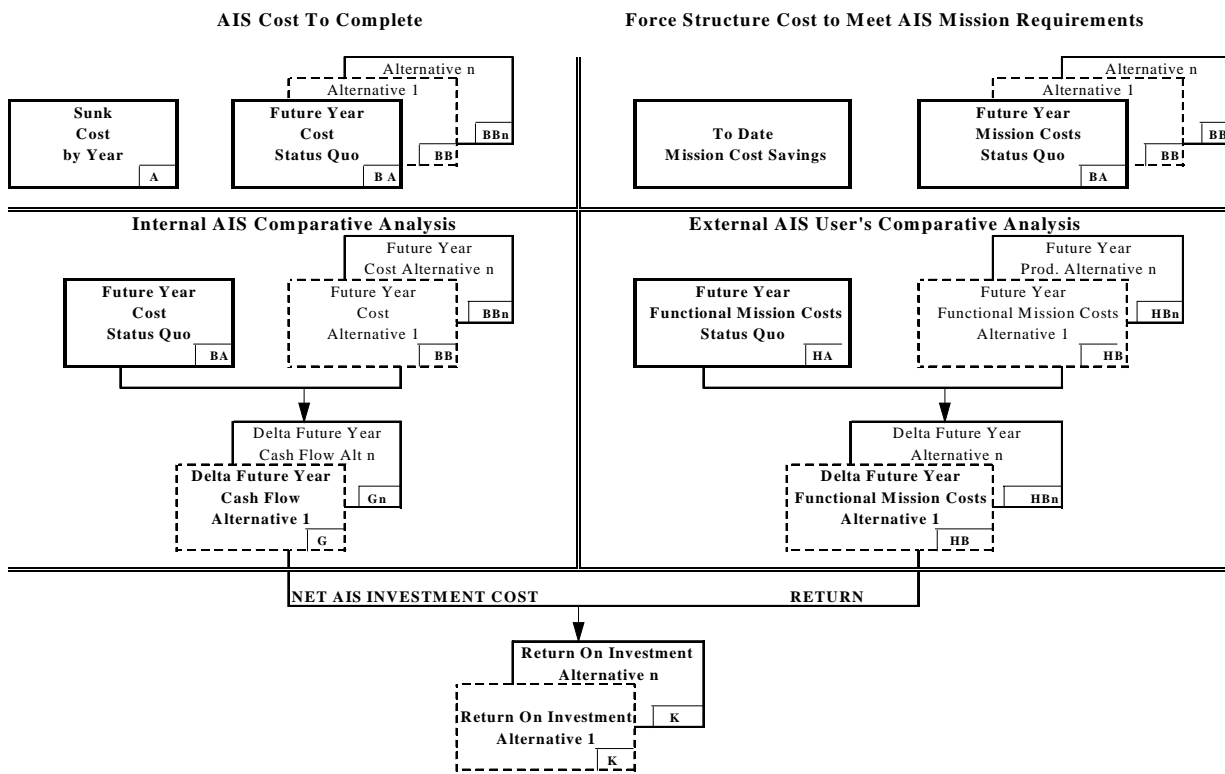
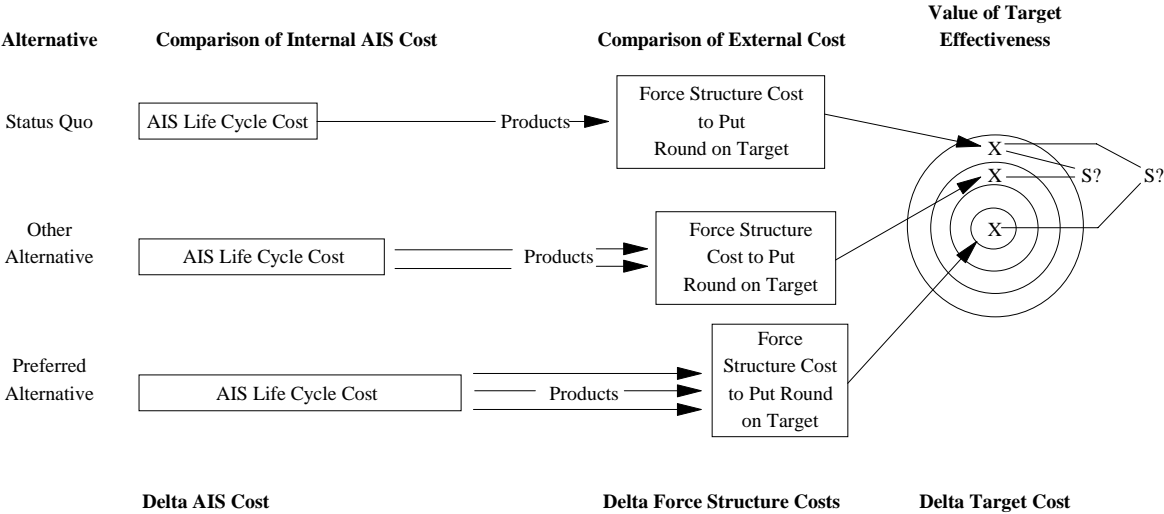


Figure E-2

**Cost/Benefits Example**



**Figure E-3**

### **Potential Benefit Drivers**

- Simplicity - Will mission operations be simplified or more complex?
- Speed - Will operations respond faster or slower to requirements?
- Understand ability - Is the system , and its functions, easily understood?
- Redundancy - Will the system reduce redundant operations?
- Reusability - Will system or parts of system be reusable?
- Accuracy - Does the alternative improve error rates or accuracy of information?
- Reliability - Will information be more reliable. Will external systems be more reliable in performance?
- Adaptability - Is the project adaptable to existing industry/national/international standards.
- Retirement - Will system allow retirement or replacement of other systems?
- Morale - Will the project contribute to a positive employee attitude toward work?
- Management Effectiveness - Will management decisions be better/worse?
- Production - Will the number of items (transactions, documents, parts) produced be increased? What is value of increased production? Benefit cannot exceed requirement level. Value cannot exceed the value of not accomplishing the function.
- Productivity - Will the rate of production (number per hour, etc.) increase? Will the system decrease the number of resources previously needed to produce the same product, or will the system allow more items to be produced with existing resources?
- Force Structure - Will any structure changes result?
- Quality - Will a better product be produced? Will better service be provided? Will quality of products be more consistent?
- R&D - Will R&D proposals be impacted?
- Security - Will more precautions be needed? Will the system be capable of handling sensitive data? Will greater security or less security result?
- Service Life - How long will the equipment be able to support the operation? Will the equipment be obsolete before it reaches the end of its useful life?
- System Design - Will System Design be simplified, less time consuming?
- Versatility - Will the equipment in any alternative provide additional capacity/capability beyond that required for the system?
- System Procurement - Will System Procurement be simplified, less time consuming?
- Flexibility - Will force structure be more adaptable to surge and changing mission requirements?
- Survivability - Will systems be more survivable?
- Communicability - Will interaction be more understandable/usable?
- Availability - Will systems be more available to meet mission requirements?
- Systems Operating & Support (O&S) - Will external systems O&S be impacted?
- Administration Actions - Will they be reduced? Paper?
- Organizational Overhead (General Administration) - Will it be impacted?
- Transportation - Will transportation and distribution costs be reduced?
- Facilities - Will facilities requirements be reduced/increased?

**Figure E-4**

## EXAMPLE

### Computation of Net Present Value

**Mission: To produce Units**

Requirement:	1994	1995	1996	1997	1998	1999	<b>TOTAL</b>
Units	10	10	11	12	13	14	70

Status Quo: Requires 10 Units of Input to produce 10 Units of Output

Alternative 1 (New system): Acquisition Costs is 10 Units

System requires 5 Units of Input to produce 15 Units of Output

System requires two years to install after acquisition.

Assumption: Discount Rate (Present Value): 10%

#### ANALYSIS

	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>TOTAL</b>
Requirement	10	10	11	12	13	14	70

#### Status Quo

Input (Costs)	10	10	10	10	10	10	60
Output	10	10	10	10	10	10	60
Benefits (Over Status Quo)	0	0	0	0	0	0	0
Net (Input - Benefits)	10	10	10	10	10	10	60

#### Alternative 1

#### FOC

Alternative 1 Acquisition	10	0	0	0	0	0	10
Alternative 1 Input (Costs)	0	0	5	5	5	5	20
Status Quo Input (Cost)	10	10	0	0	0	0	20
* Output	10	10	(15) 11	(15) 12	(15) 13	(15) 14	70
Benefit (Over Status Quo)	0	0	1	2	3	4	10
Net (Input - Benefit)	20	10	4	3	2	1	40

<b>Present Value Rate(10%)</b>	<b>1.00</b>	<b>0.90</b>	<b>0.81</b>	<b>0.73</b>	<b>0.66</b>	<b>0.59</b>	<b>-</b>
--------------------------------	-------------	-------------	-------------	-------------	-------------	-------------	----------

#### Net Present Value

Status Quo	10	9	8.1	7.3	6.6	5.9	46.9
Alternative 1	20	9	3.2	2.2	1.3	0.6	33.3

#### Comparison

Alternative 1 - Status Quo	<b>-13.6</b>
----------------------------	--------------

\*Note : Output cannot exceed Requirements. Excess Capacity is not a benefit.

**Figure E-5**

## **ASSIGNING VALUES TO NON-QUANTIFIABLE BENEFITS**

### **Alternative B**

#### **Step 1      Design Benefits**

Reduced Inventory	-Quantifiable
Reduced Maintenance Costs	-Quantifiable
Timelier Reporting	-Non-quantifiable
Better Service to Field	-Non-quantifiable

#### **Step 2      Rank Benefits**

1. Reduced Inventory
2. Better Service to Field
3. Reduced Maintenance Costs
12. Timelier Reporting

#### **Step 3      Quantify Benefits**

Reduced Inventory	\$ 75,000
Reduced Maintenance Costs	\$ 25,000

#### **Step 4      Assign Values to Non-quantifiable Benefits**

Reduced Inventory	\$ 75,000
<sup>1</sup> Better Services	\$ 50,000
Reduced Maintenance Costs	\$ 25,000
<sup>2</sup> Timelier Reporting	\$ 5,000
Total	\$155,000

<sup>1</sup>In step 2, "Better Services" were ranked halfway between "Reduced Inventory" (\$75,000) and "Reduced Maintenance Costs" (\$25,000). Thus, "Better Services" was assigned a value of \$50,000.

<sup>2</sup>In step 2, "Timelier Reporting" was ranked last and was considered significantly lower in value than "Reduced Maintenance Costs". Thus, "Timelier Reporting" as assigned a value of \$5,000.

**FIGURE E-6**

### **WEIGHTED RANKING CHART - ALTERNATIVE B**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Rank</b>	<b>Benefit (Critical success factors)</b>	<b>Weight</b>	<b>Average Alternative Score</b>	<b>Weighted Score Column 3 X Column 4</b>
1	Improved work ethic	10	10	100
2	Increased quality of reports	9	2	18
3	Developed team work	7.4	4	29.6
4	Compatibility with current procedures	7.4	3	22.2
5	Management access to data	5	7	35
6	Flexibility	3.7	8	29.6
7	Maintainability	3.6	9	32.4
8	Better management decisions	3.2	6	19.2
9	Developed better company image	3.1	10	31
10	Increased reliability of data	3	4	12
11				
12				
13				

**Alternative  
Score : 329**

#### **Alternative Comparison**

Alternative A, Baseline (Status Quo)	200
Alternative B, Total Upgrade	<b>329</b>
Alternative C, Shared Upgrade	295
Alternative D, Conversion	250

**Figure E-7**

## **ATTACHMENT F to, DoD Automated Information System (AIS) Economic Analysis (EA) Guide**

### **AIS Parameters & Definitions**

F-1 Automated Information System (AIS) Any combination of resources involved with and directly related to computer or information processing and display (business machine) hardware, software, data, telecommunications, etc., that are essential to the systemic accomplishment of mission or business process functions. AIS embedded or directly in support of weapon systems and special systems classified or security sensitivity are excluded from this definition.

F-2 Major AIS? An AIS that meets any of the following criteria [thresholds expressed in Fiscal Year 1990 constant dollars]:

- Has anticipated program cost in excess of \$100 million from the time of program initiation through the attainment of full operational capability at all operational sites,
- Has anticipated program cost in excess of \$25 million in any single Fiscal Year,
- Has anticipated life cycle cost (LCC) in excess of \$300 million; or,
- Is designated a Major AIS by the Chair of the Major Automated Information System Review Council (MAISRC).

F-3 AIS Alternative Costs For the purpose of DoD EA, AIS Alternative Costs are the estimated costs for any resource requirement, expenditure of Government funds or assignment of Government resources [regardless of funding source (including any funds required from the Defense Business Operating Fund or other Operating fund), method of expenditure (in-house or contract), program title (AIS alternatives may be supported by multiple programs identified in the Budget), or type of funds (R&D, Procurement, O&M, etc.)] required to create, implement and sustain an AIS system design alternative throughout its full life cycle.

- Investment costs that are deferred or amortized as leased or out-service costs over the life cycle of an AIS and incurred in lieu of up front capitol investment to support an AIS shall be included in both AIS program and life cycle cost estimates.
- Government Furnished Equipment and Services (GFE&S) required to support or implement an AIS alternative shall be included in both AIS program and life cycle costs.
- All Government expenses required to support the full scope of an AIS alternative must be included in AIS program and life cycle cost estimates regardless of any fragmentation of program/project management, evolutionary or migratory program definition, or support from multiple contracts and funding sources.

F-4 Scope of an AIS Alternative The full scope of an AIS Alternative is determined by two primary parameters: 1) the Status Quo or the extant business process and AIS, if any, that exists at the time of the analysis (this could be a partially implemented preferred alternative); and, 2) the functional or mission capability that is required. For the purpose of DoD EA, the difference between the Status Quo and the required or stated critical mission needs defines the system design specifications and the scope of the required AIS alternative . As defined and supported in the Functional Economic Analysis (FEA), the difference between the existing capability and the required capability is equated to required system operational benefits. The default cost scope of an AIS alternative is defined, therefore, as the total cost to the Government (program or LCC) required to

achieve fully the change, transition, modification, upgrade, improvement, or avoidance of obsolescence from the existing system to the proposed system that will provide the minimal required capability. In essence, the benefits specified and estimated for an AIS determine the scope of the AIS program alternative required. The cost estimate for each AIS system design alternative must support fully the attainment of its estimated benefits.

**F-5 AIS Program Costs** The entire cost to the Government to attain full deployment and functional implementation of the **unfragmented** preferred alternative AIS including all sunk and future costs required to attain **Full** Operational Capability (FOC) and deployment to **all** required sites. This includes all research and development, investment, initial support, and any operating and support costs required to attain FOC. AIS program costs are not restricted to those costs incurred directly by the AIS program, included in a single program or budget element, or supported by a single contract. Most large AIS programs are supported by multiple sources of supply (IQID contracts, GFE, In-house software development, out-source services, leasing, etc.). All costs required to attain estimated system benefits are included in AIS program costs.

- The cost to maintain or support AIS alternatives other than the preferred alternative (such as the status quo system) are not included in the preferred alternative program cost estimate unless those costs are required to implement or sustain the preferred alternative.
- For incremental and evolutionary AIS programs, program costs include all increments. Partial program cost estimation and program review and approval must be based on the stand-alone costs and benefits associated with each defined increment, and the validation and approval of one increment may not be construed to imply approval of other increments.
- AIS program cost does not include the recurring investment required to operate an individual site after the site has been fully implemented and the overall system has achieved full operational capability.

**F-6 Sunk Costs** For the purposes of DoD EA, sunk costs are defined as all irretrievable expenses incurred or otherwise required by the Government in support of the attainment of an AIS alternative.

**F-7 AIS Modernization Costs** For the purpose of DoD AIS EA, AIS modernization costs are any AIS related capital investment or expenditure of Government resources required to update, improve, change, modify or prevent the obsolescence of an AIS alternative. This includes any AIS related capital investment that:

- Improves system performance or enhances products
- Expands the scope of the AIS
- Reduces system cost
- Improves system supportability, availability, reliability, maintainability, security, or survivability,
- Improves system communications, integration or accessibility
- Makes the system more user-friendly
- Consolidates two or more existing systems

Excluded from this definition are minor investments and expenditures of Government resources required to manipulate or maintain the usefulness of existing systems. Minor investments are defined as those that require less than \$2 million in a single Fiscal Year or less than \$5 million for total project

completion [estimated in Fiscal Year 1990 dollars]; and , that are not fragmented elements of an overall AIS alternative modernization.

**F-8 AIS Program Alternative Life Cycle Costs** The total cost to the Government for an AIS alternative over its entire system life from the time the program is initiated in the DoD Budget process through its disposal. AIS Life Cycle Costs include:

- All AIS alternative program costs
- All operating and support costs required to sustain and operate the AIS alternative over its life cycle
- All system upgrades, pre-planned product improvement, avoidance of obsolescence, system enhancements and engineering changes required throughout the AIS alternative life cycle
- The standard DoD AIS life cycle includes a ten year period of operations after all sites have been fully implemented and system FOC has been attained
- A major system upgrade is required every four to six years after site implementation:
  - \* To prevent obsolescence
  - \* Take advantage of improved technology
  - \* Meet anticipated mission/functional growth requirements
  - \* Implement deferred requirements

**F-9 AIS Return** AIS Returns, as shown in Figure F-1, are the net result of a comparison of the AIS investment costs and operational expenses; and, the cost impact of the AIS on the Functional Area or cost to do the mission. In all cases, benefits expressed in Present Value, are derived from a comparison of the net functional area result (expressed in dollars) of implementing the AIS acquisition alternative vice the continued operation of the status quo or extant system used to meet the mission need.

**F-10 Preferred AIS Alternative** The Preferred AIS Alternative is the AIS acquisition program that is selected and funded for implementation as the most advantageous AIS alternative available to the Government and the DoD. By definition , the preferred AIS alternative should meet all mission critical criteria at lower LCC or provide a higher return on investment (ROI) than any other alternative.

**F-11 Cost Analysis Requirements Description (CARD)** This Guide requires that the AIS Functional Area Sponsor (FAS), in conjunction with the AIS Program Manager develop, document and submit, as a basis for estimating life cycle cost and benefits, a detailed description of the baseline features of the program and of the AIS being acquired. This information is submitted in 1) a Cost Analysis Requirements Description (CARD), as provided by Chapter 1 of DoD 5000.4-M, "DoD Cost Analysis Guidance and Procedures", December 1992, on each AIS alternative including the Status Quo; and, 2) a CARD for the entire functional area and specific activities impacted by the AIS. The information provided in the CAD will provide the logic, data and overall basis for the analysis that results in the estimated costs and benefits provided in the DoD APEA Data Entry Spreadsheet (Model) formats as displayed in Figure A-1.

**F-12 Critical Parameters for AIS APEA.**

F-12.1 AIS Program Life Cycle. The standard AIS program life cycle extends from the time of the initial obligation of funds through the end of the useful system life. The standard DoD AIS life cycle includes 10 years of Full Operational Capability (FOC) at all sites with a major technological refreshment for obsolescent hardware replacement between 4 and 6 years after FOC is attained.

F-12.2 The Preferred Alternative (PA). The PA is the AIS investment, modification, change acquisition program required to meet the Mission Need Statement. Normally the PA is funded fully. PA costs and benefits are estimated for the entire life cycle of the AIS as created or changed by the AIS acquisition program.

F-12.3 The Status Quo Alternative (SQ). The SQ Alternative is the extant system used to accomplish the business function or activity that will change if the Preferred AIS Alternative is implemented. The SQ covers the same period (life cycle) as the PA and represents the comparative economic analysis baseline (i.e., minimum capital investment required to sustain current operations, without pre-planned or budgeted economic refurbishment unless the refurbishment can be accomplished with no increase in the minimal operational budget). As such, the status quo system may or may not be a reasonable alternative in that it may cost too much to sustain, be unable to meet critical mission needs and may not be supportable due to technological obsolescence. Nevertheless, the SQ, as defined herein, must be estimated and used as the low investment AIS APEA baseline.

F-12.4 Return on Investment (ROI). ROI is the ratio of the future economic return (in present value dollars), directly attributable to implementation of an AIS alternative, to the full and unfragmented future cost (in present value dollars) to the Government to implement the AIS alternative. Although it will not be possible in all cases, the standard required ROI for AIS acquisition program approval is 10% when compared to the Status Quo alternative (See Paragraph E-5). Any AIS program that cannot meet these criteria must provide substantial impact/mission justification.

F-12.5 Analytic Content. The amount of effort and the level of detail in AIS economic analyses must be appropriate to the size of the capital investment required, and to the amount of risk inherent in the program. The analytical effort should substantiate both a net positive return on investment over the system life cycle, and selection of the most advantageous technical solution. Major AIS Cost/Benefit requirements are tailored for each program and documented in written agreements (Figure 1-1) among the validation authority the ICA, the FAS and the PM.

Each EA must be current in the fiscal year in which it is resented and must provide detailed documentation of the analytic approach and methodology and assumptions used. Areas of risk or uncertainty must be identified and the potential effects on analytical results quantified.

F-12.6 AIS Program Fragmentation. AIS investments may not be fragmented to avoid exceeding APEA thresholds. All resources (regardless of funding source or type) required to achieve the desired system benefits, or to achieve the goals established in the Mission Need Statement, must be included in the AIS APEA estimates and AIS cost thresholds.

- \* Investments that benefit more than one business area or AIS should be prorated in accordance with the time or the capacity the investment provides to each AIS.

- \* Any material or services that consume or use Government resources and are required to implement fully an AIS must be included in the AIS APEA estimate.
- \* Any resources acquired under a different program or Indefinite Quantity/General Purpose contract to support an AIS must be included as a direct cost to the AIS supported.
- \* Any investment, lease or service provided by a central processing function or service agency to support an AIS (out-sourcing) must be included as a direct cost to the AIS supported.
- \* Any funds provided through operational/industrial funding in support of an AIS must be included in the cost of the AIS.
- \* The value of government assets provided to support an AIS may be appropriately depreciated based on age and projected useful life.

F-12.7 Incremental Programs. An incremental program is generally characterized by acquisition, development and deployment of functionality through a number of clearly defined system “increments” that essentially stand on their own. (Some of the investment for the initial increments, particularly for hardware, may support later increments.) DoDI 8120.2 recognizes that systems developed in increments cannot be overseen effectively using the traditional milestone approval process. Hence, it states that “depending on the selected program strategy, combined or repeated milestone decision points and associated activities within the life cycle phase may be required. The number of replicated decision points, and how increments between those decision points are reviewed, shall be specified in the proposed program strategy presented at Milestone 1.” Despite this problem, replicated decision points have seldom, if ever, been used in the MAISRC process.

The costs and benefits for an incremental program are difficult to estimate for the program as a whole because different increments are at different stages of definition, development and deployment. The cost and benefit estimates are normally most accurate and verifiable for those increments that are closest to deployment. Future increments, which account for a large portion of the claimed benefits, fluctuate regularly in terms of the functionality that they will encompass. Thus, OD (PA&E) recommends that the cost and benefits analyses for an incremental program undergoing a MAISRC milestone review be focused on the increment or increments that are in phase with that milestone. The drawback to this approach is that, because of an initial investment in hardware and system configuration, the return on investment for early increments may not be as favorable as for the program as a whole. This factor must be taken into account in the cost/benefit review.

Cost and benefit estimates on the early phases (or phases under review approval) of an incremental program must be supported by standard AIS EA documentation that can be validated by OD (PA&E). Later increments should be identified as potential future upgrades, and costs and benefits should be identified. However, although later increments, i.e., increments not under current review, must be identified and documented as well as possible. OD (PA&E) will review later increments for overall reasonableness rather than require that they be validated. Later increments must be fully documented and validated by the independent cost reviewer prior to their oversight or milestone approval after Milestone 2.

F-12.8 Migration Programs. Migration programs are essentially composite incremental programs that are likely to have concurrent, as well as, sequential increments. Near term increments should be both structurally and programatically baselined to include validatable EAs. Later increments should be estimated accordingly. Although later increment estimates must be deemed reasonable, their validation will be deferred until they are baselined and subject to Milestone 2 or beyond approval.

F-12.9 Derivation of Data. To the maximum extent possible, cost and benefit estimates must be based on data derived from actual test results, cost/benefit tracking systems, and extrapolations from similar systems that have already been developed and deployed. When this is not possible or the early test results may be misleading, standard cost estimating tools, models, and quantitative relationships may be used. Prior to Milestone II, analysts are encouraged to provide expected ranges of costs and benefits for each AIS alternative examined.

F-12.10 Cost and Benefit Data Structure. The AIS User's Manual published by the OD(PA&E) provides details on the required standard spreadsheet data entry formats. These standard formats will be used for all AIS APEAs prepared by any DoD agency or organization.

F-12.11 Basic Qualifications for Performing AIS APEA. Preparing an APEA for a major AIS is a highly complex business requiring the assistance of qualified cost or operations research analysts. In many cases, development of a successful AIS APEA will require the assistance of a team of specialists that can provide a wide range of experience and technical skills.

F-12.12 Contractor Support for AIS APEA. Often, the skills necessary to perform AIS APEA are not available among the government staff available to the FAS. Further, these specialized EA skills may not be required on a continuing basis. It is often necessary, therefore, to acquire specialized contractor support for the development of the AIS APEA.

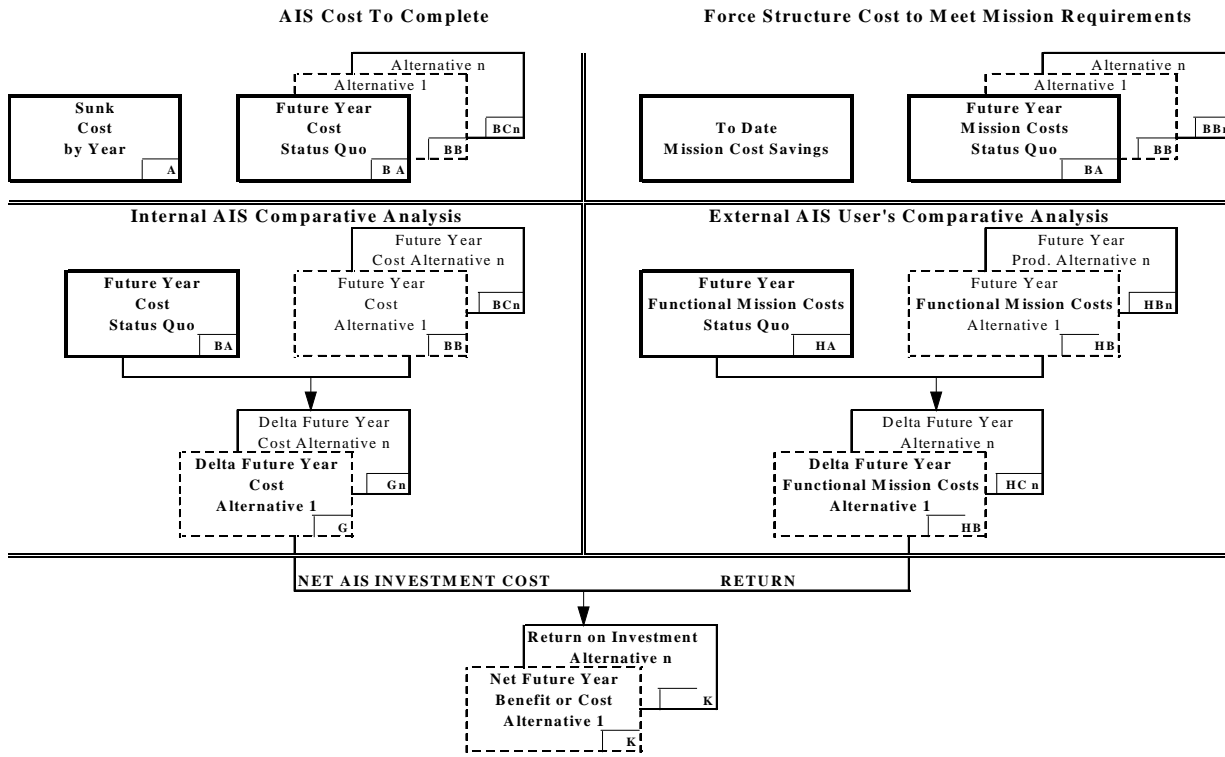
The AIS APEA is one of the principal tools used by the government in acquisition and resource allocation decisions. The results of the APEA may also be a determining factor in acquisition source selections. Since APEA is so closely tied to these inherently governmental functions, the contractors role in AIS APEA must be carefully limited. Contractors may be used to develop or use cost or benefit estimating tools, and they may apply those tools to develop estimates. Contractors may also compare costs and performance of various AIS program alternatives. Contractors may not, however, select the AIS program alternatives that will be pursued by the government, nor may contractors be involved in the presentation of the AIS APEA to AIS acquisition review authorities.

When contract support is used in the development of an AIS APEA, the contractor will not be permitted to:

- \* Participate in any study, research or analysis that may result in a conflict of interest. In particular, a contractor may not support any APEA where the knowledge gained through EA development might affect the outcome of a contract award by the government.

- \* Disclose or otherwise provide information gained through EA development to any agency outside the sponsoring government agency without the express written consent of the sponsoring agency.
- \* Provide any support, analysis, or recommendations with respect to the review or validation of an AIS by the independent review authorities. Prior to the use or assignment of contractors in APEA development, the contractor must:
  - a) Take all necessary measures to avoid any appearance or action that might affect directly a government acquisition source selection decision;
  - b) Provide a statement certifying the absence of any corporate or private interest in the AIS other than in the performance of the APEA;
  - c) Agree not to disclose information acquired through APEA development to individuals or organizations not involved in APEA development without the written approval of the FAS;
  - d) Provide evidence of sufficient internal corporate security procedures, plans, and controls to ensure the protection of the information entrusted to them by the government. Both non-disclosure and absence of conflict of interest statements must be signed by a responsible individual representing the contractor, and by each individual who has direct knowledge of or access to the information contained in the APEA.

# **AIS Acquisition Program Economic Analysis Formats**



**Figure F-1**

**ATTACHMENT G to, DoD Automated Information System (AIS)  
Economic Analysis (EA) Guide**

**MODEL FORMATS AND REPORTS**

**F-1 Input Formats.** The input formats described in following sub-paragraphs, must be submitted for every MAISRC review.

**F-1.1 Format A, Prior Year (Sunk) Costs.** Format A is common to and required for all alternatives, including the ICE. Sunk Costs reflect actual expenditures for all alternatives from the time of program initiation up to the end of the fiscal year of the Life Cycle Management review and should be identical for all alternatives. If an alternative has different sunk costs then the Status Quo, the issue should be discussed with OD (PA&E). Format A is submitted by the FEAA and used by all alternatives in computing the Life Cycle Costs. It is not used in computing the ROI.

**F-1.2 Format AP, Prior Year (Sunk) Costs, Previous Submission.** Format AP is obtained from Format A of the last EA submission. It is used by Format DB to highlight changes which have occurred since the last review. It is obtained by loading the last Format A and Format AP on to RAM. Format AP includes an escalation factor in cell **O10** which must be entered by the Program Office. This factor is then applied to all figures within the spreadsheet, thereby automatically converting the old constant year dollars to the current year. This Format can also be used to convert any Format A estimate to a different base year dollars. Format AP is submitted by the Program Office.

**F-1.3 Format BA, Future Year Costs, Status Quo.** Format BA is required for every EA submitted for DoD MAISRC review. It is the standard against which all other alternatives are measured. The years that Initial Operational Capability (IOC) and Full Operational Capability (FOC) will occur in the Preferred Alternative should be indicated. The assumed standard life cycle is ten years after FOC is reached at all sites within the system. Note that not all cost elements apply to every year in the life cycle. Shaded areas in the spreadsheets reflect those areas that should not have associated costs. Format BA is submitted by the FEAA.

**F-1.4 Format BB, Future Year Costs, Other Alternative.** Format BB is required for each alternative being considered in the EA. A separate directory is required for each Other Alternative; however, not all files are required for alternatives other than the Preferred Alternative. Format BB is submitted by the Program Office.

**F-1.5 Format BI, Future Year Costs, Other Alternative, Independent Estimate.** Format BI is required for the Preferred Alternative only. It is required for each Milestone after Milestone 1 for systems undergoing DoD MAISRC review. Exceptions to this requirement must be obtained from OD (PA&E) at least six months prior to the MAISRC review. Format BI is submitted by the Independent Cost Agency.

**F-1.6 Format BP, Future Year Costs, Preferred Alternative, Previous Submission.** Format BP is obtained from Format BB of the last EA submission. It is used by Format DB to highlight changes which have occurred since the last review. It is obtained by loading the last Format BB and Format BP on to RAM. Format BP includes an escalation factor in cell **V10** which must be entered

by the Program Office. This factor is then applied to all figures within the spreadsheet, thereby automatically converting the old constant year dollars to the current year. This Format can also be used to convert any Format B estimate to a different base year dollars. Format BP is submitted by the Program Office.

F-1.7 Format FB, Program Requirements and Budget Comparison. Format FB is required for the Program Manager's preferred alternative only. It is not required for the ICE. Total Estimated Program data will be obtained automatically from Format BB. Program requirements and budget information must be input by the Program Office. Format FB is submitted by the Program Office.

F-1.8 Format HA1 through HA5, Functional Cost Changes, Status Quo. Format HA1 and/or HA2, HA3, HA4, HA5 is/are required for all alternatives submitted. It is not required for the ICE. Care must be taken to ensure operating cost of the AIS program, and reflected in Format BA, are not double counted as Functional Cost Changes in Format H. Formats HA1 through 5 are submitted by the FEAA.

F-1.9 Format HB1 through HB5, Functional Cost Changes, Other Alternative. Format HB1 and/or HB2, HB3, HB4, HB5 is/are required for all alternatives submitted. It is not required for the ICE. Care must be taken to ensure operating cost of the AIS program, and reflected in Format BB, are not double counted as Functional Cost Changes in Format H. Formats HB1 through 5 are submitted by the FEAA.

**F-2 Derived Formats.** The model contains numerous spreadsheets which are used to facilitate the review of the Economic analysis, compare the estimates, compute the economic advantage of each alternative, track the evolution of the estimates, and display the outcome. They do not require any entries and are made available to all who wish to conduct a detailed review of the economic viability of an AIS program alternative. All of these formats are generated from the data submitted in the Input Formats and may be included in the EA report, but are not required.

F-2.1 Format CA, Life Cycle Cost, Status Quo. Format CA will be automatically generated from Formats A and BA. It contains only the third level of indenture in the Cost Element Structure. Figures are automatically converted to millions.

F-2.2 Format CB, Life Cycle Cost, Other Alternative. Format CB will be automatically generated from Formats A and BB. It contains only the third level of indenture in the Cost Element Structure. Figures are automatically converted to millions.

F-2.3 Format C-1, Life Cycle Cost, Other Alternative. Format C-1 is automatically generated from Formats A and BB. It is a summary level chart at the second level of indenture and is provided for top level presentations.

F-2.4 Format C-2, Life Cycle Cost, Other Alternative. Format C-2 is the same chart as C-1 with the third level of indenture added. It is provided for middle management presentations where discussions of the specific approach to the estimating task can be expected.

F-2.5 Format DB, Comparison with the Previous Estimate. Format DB is a comparison of the Preferred Alternative estimate with the last Previous Estimate or Program Baseline if a baseline has been established. Format DB is normally generated only for the Preferred Alternative submitted by the Program Manager. Format DB will be automatically generated from Formats A, AP, BB and BP, Total columns. If the cost estimate is the first estimate prepared (Milestone I) this format will be omitted from the analysis. The Delta column is automatically obtained by subtracting the current estimate from the previous estimate. The “% Change” column contains the notation “#DIV/0!” (Number divided by 0) or “N/A”. This notation will be replaced by a percentage figure when data is entered.

F-2.6 Format EB, PM Estimate and ICE Comparison. Format EB is generated for the preferred alternative only. It is automatically generated from Formats BB and BI. This format compares only future costs of the PMO and the ICE at the third level of indenture. The Delta column is automatically obtained by subtracting the PM Estimate from the ICE. The “% Change” column contains the notation “#DIV/0!” (Number divided by 0) or “N/A”. This notation will be replaced by a percentage figure when data is entered.

F-2.7 Format G, GB1 Delta Costs. Format G is generated for all alternatives (except Status Quo) submitted by the program manager. The figures shown for the Alternative and Status Quo are obtained automatically from Format BA and BB. The data is converted from thousands as shown in Formats BA and BB to millions automatically and the Delta is obtained by subtracting the Status Quo from the Alternative. Format GB1 is a summary of the delta costs. It list the total by CES only in thousands.

F-2.8 Format HA, Functional Area Cost Change, Status Quo. Format HA is automatically generated from inputs to Formats HA1 through HA5. The "Total All Components" row is automatically input to Format K. Note that no cost changes are reflected before IOC. If it is felt that program benefits will accrue before system deployment discuss this issue with the OD (PA&E) analyst prior to identifying these costs.

F-2.9 Format HB, Functional Area Cost Change, Other Alternative. Format HB is automatically generated from inputs to Formats HB1 through HB5. The "Total All Components" row is automatically input to Format K.

F-2.10 Format I, Delta Functional Area Mission Costs. Format I is normally generated only for the preferred alternative. It is automatically generated from Formats HA and HB.

F-2.11 Format JB, Comparison with Previous Functional Area Cost Changes. Format JB is normally generated only for the Preferred Alternative. It is produced automatically from Formats HB and HP. It shows the track of the benefits estimates from the previous submission.

F-2.12 Format K, Return on Investment. Format K automatically takes the AIS cost entries from Formats BA and BB and computes the net AIS cash flow from the current year through FOC. The discount rate (supplied by the Program Office and input to Row 59) is then applied to this stream of investment cost to derive the present value of the net investment. It also automatically takes the AIS cost entries from Formats BA and BB and computes the AIS net cash flow for the years after FOC

and adds this stream of net expenditures to the Return. Format K then takes the Functional Area Mission cost changes from Formats HA and HB, computes the delta and adds these costs to the Return cash flow. This stream of cash flows are discounted similar to the Investment cost to derive the present value of the return. The format then divides the sum of the present value of the return stream by the sum of the present value of the investment stream to produce the Return on Investment index.

F-2.13 Format L, Net Budget Impact Display. Format L is generated automatically from the data entries in Format K. It displays the potential budget impact for all future years of implementing the alternative.

**F-3 Charts.** A series of charts are included in the model for use by the cost analysts in developing the presentation of the cost estimates and the results of the analyses. These charts are not required and are offered to assist the analysts as desired. They are presented in Millions (Charts 1-9) and Billions (Charts 1A-9A) These charts are generated from an intermediate spreadsheet which records the data and provides it to the chart files automatically. The file titled “Charts” requires the following manual input:

FROM	TO
Format BA, Row 114 & 231	Charts, L8 through AE8
Format BB, Row 492 & 723	Charts, L14 through AE14
Format HA, Row 11 & 57	Charts, L20 through AE20
Format HB, Row 11 & 57	Charts, L26 through AE26

Once the data is input, the analyst must delete the linking formulas and data in the following cells:

- Charts, Row 32 - Cells covering FOC + 1 Through FOC + 10
- Charts, Row 41 - Cells covering the years prior to FOC and FOC
- Charts, Row 49 - Cells covering the years prior to IOC and IOC